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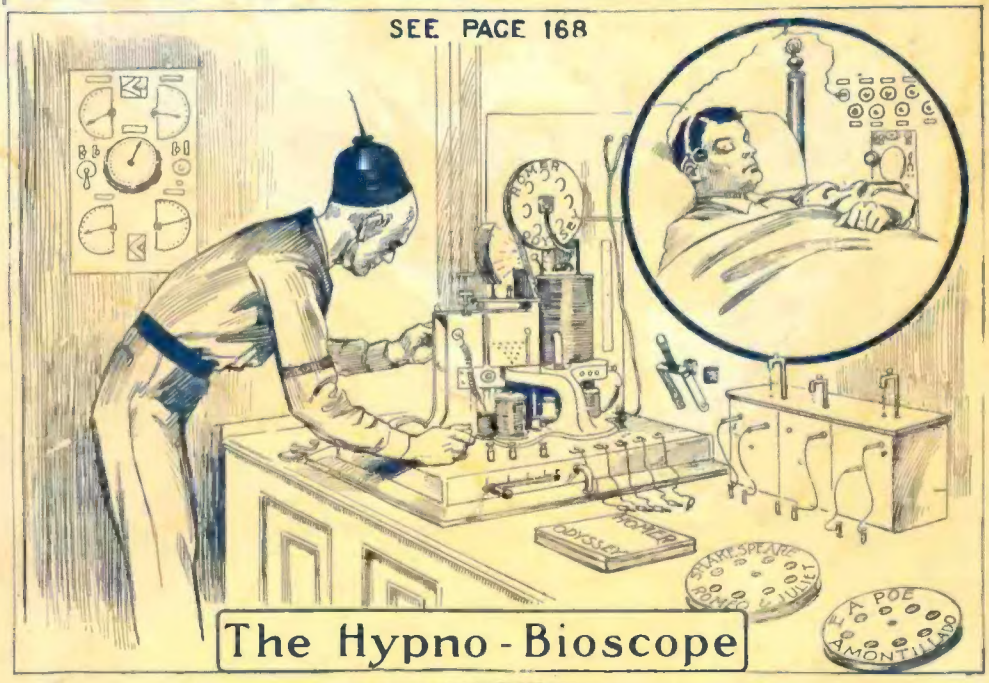
SEE PAGE 168



The Hypno-Bioscope

Contents

THE PRACTICAL ELECTRICIAN
By Professor W. Weller
HIGH FREQUENCY CURRENTS
By Norman Barden
RALPH 124C 41 +
By H. Gernsback
THE ROSING TELEPHOT
BELLINI-TOSI APPARATUS
By A. C. Marlowe
WIRELESS INTERFERENCES AND PERTURBATIONS
By I. E. Taylor
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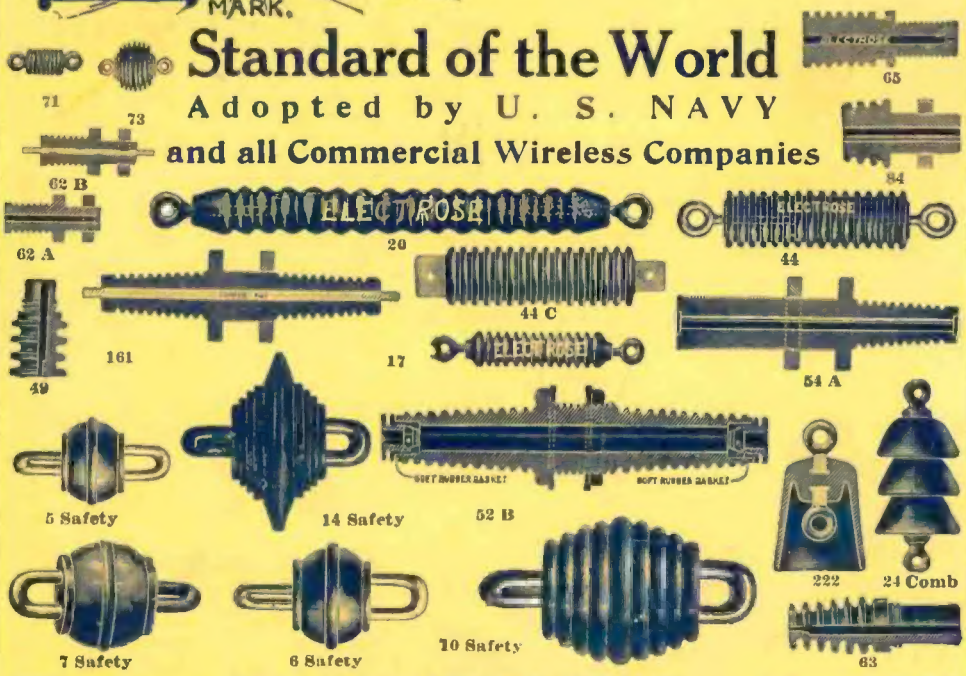

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Modern Electrics

VOL. IV. JUNE, 1911. No. 3.

The Practical Electrician

A Popular Course in Electricity on the Construction of Electrical Apparatus and Experiments to be Conducted with them

By PROFESSOR W. WEILER, of the University of Esslingen, (Germany)

Translation by H. GERNSBACK

CHAPTER I.—Continued.

26. CARBON CONNECTIONS.

FIG. 24 shows how to obtain connection with a carbon plate. This method is used when a quantity of wet (acid) batteries are connected together. Underneath the screw, S, a metal washer is placed in order not to damage the plate; this also gives a better contact on account of the larger surface.

Another good method is to pour lead

Fig. 24

or zinc around the head of the carbon, which, after cooling, contracts and makes a good connection.

A good connection for carbon cylinders is shown in Fig. 25. A lead strip is placed around the edge and around this strip a copper or brass band is placed. The latter is pressed tightly to the lead and this to the carbon by means of screw, S.

Fig. 26 shows another means to connect on a carbon cylinder. The piece, P, is soldered to the connecting wire and the former is pressed on the carbon by means of screw, S.

Contact points must always be absolutely clean because all dirt and metal oxide greatly increases the resistance at such points, with a corresponding decrease of the current intensity. To clean dirty metal parts, use sandpaper or emerypaper and rub till the bright metal appears. To safeguard metal parts on batteries, especially those on acid batteries, cover them with vaseline, shellac, etc.

27. THE ZINC OF THE BATTERIES.

It sometimes happens that one cannot obtain the necessary zincs. In such a case one cuts up small zinc pieces and melts them in an iron vessel or in a crucible under a layer of charcoal powder, which latter prevents oxidation and burning of the zinc. The molten metal is then poured between two pieces of slate, stone or marble, the open ends at the two sides having been closed with fresh clay. This method of course is only possible for plates.

To cut heavy zinc plates proceed as follows: Take a sharp file and scratch a deep groove into the zinc plate where it is to be cut. Pour a few drops of muriatic acid into the groove and then a few drops of mercury on top of the acid. Rub the mercury well into the groove by means of a soft stick of wood. The plate

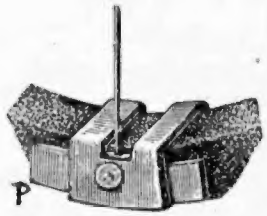


Fig. 26

will then break quite readily along the groove.

Zincs must *always* be bent or shaped before being amalgamated as amalgamated zinc is extremely brittle. All soldering must invariably be done before amalgamation also, as it can not be soldered afterwards. Zinc which can not be am-

algamated readily usually contains iron and is unfit for use in batteries.

Batteries having a porous cell should contain mercury near the zinc in the porous cell so that the amalgamation even goes on while the battery works.

Zinc should be turned or drilled using oil for lubricant. Brass is turned dry, copper with soap water. Screws for zinc should have a steep pitch, similar to wood screws.

28. PEROXIDE OF MANGANESE BATTERIES, 1868.

Fig. 27 shows the so-called bag battery. The linen bag contains black oxide of manganese (about 97 per cent.) and carbon powder, which is pressed around a carbon rod. For this an arc lamp carbon may be used. The zinc rod or plate should be about ¼ inch distant from the bag. The electrolyte is composed of 1000 parts water and 250 parts sal ammoniac. One quart of a concentrated solution of sal ammoniac is able to give up to 130 ampere hours.

The chemical reaction of these batteries the same as that of all modern dry cells is as follows:

The zinc takes from the sal ammoniac (chloride of ammonium) $=2NH_4Cl$, the chlorine and forms with this chloride of

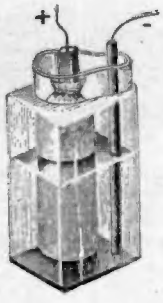


Fig. 27

zinc=Zn Cl, and ammonium $2NH_4$ is liberated. As this is electropositive, it is conveyed to the negative (carbon) element and is divided at the carbon surface into $2NH_3$ and free hydrogen. The ammonia $2NH_3$ escapes and can be recognized by its smell; on the other hand from the manganese ($2MnO_2$) one atom oxygen takes the hydrogen H_2 and with this forms water; during this process the manganese becomes oxide of manganese (Mn_2O_3).

These two processes may be represented by the following two formulae:

$$Zn+2NH_4Cl=ZnCl+2NH_3+H_2$$

$$H_2+2MnO_2=MnO_3+H_2O$$

It must be understood that all forms of batteries using oxide of manganese as a depolarizer cannot be used for continuous service, as they polarize too quickly, with a proportionate drop of voltage. These batteries are only to be used for intermittent work, where they have a chance to recuperate.

Batteries having a zinc rod or small plates give very little amperage, as the latter always depend on the surface of the two electrodes. Batteries as shown

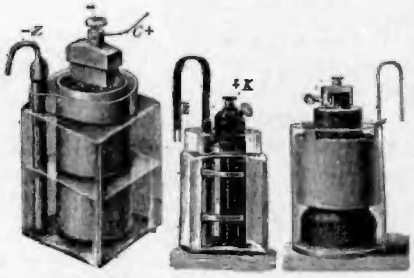


Fig. 28 Fig. 29 Fig. 30

in Figs. 28, 29, 30 give only about one-half to one ampere, while a battery as shown in Fig. 30 on account of the large surface of both zinc and carbon gives from 12 to 25 amperes, all depending on the size of the elements.

Fig. 28 shows the oldest known type of the oxide of manganese type; it is the so-called Leclanche battery and comes out of use more and more. The carbon plate, C, which has a metallic head is placed in a porous cup which contains around the carbon coarse pieces of oxide of manganese. On top of this a layer of sealing wax is poured. The zinc is about 7 inches long and ½ inch in diameter. The solution is made of water and sal ammoniac.

Fig. 29 shows the Briquette battery. The carbon, K, is surrounded by two heavy plates made of 40 per cent. oxide of manganese, 44 per cent. graphite, 9 per cent. coal tar, 0.6 per cent. sulphur and 6.4 per cent. water. Another method uses 40 per cent. oxide of manganese, 50 per cent. carbon and 5 per cent. shellac. The ingredients are ground fine, mixed and pressed into plates under a pressure of 300 lbs. to the square inch, and heated to 300 to 350 degrees centigrade. These

plates may be used alone in a battery or else they are pressed to a central carbon plate by means of stout rubber bands as shown in Fig. 29. This battery uses the usual electrolyte.

An electrolyte giving particularly good results and which produces a powerful current is made as follows: 100 parts sal ammoniac, best grade, 30 parts cooking salt, 30 parts chloride of zinc (technical).

Fig. 30 shows the so-called Fleischer battery and this battery develops strong currents if used intermittently.

29. MARIÉ-DAVY BATTERY, 1859.

This battery is used a good deal for electro-medical apparatus. It is made of a small glass jar about 4 inches high, which contains clear water and a piece of sheet zinc. The carbon is placed in a porous cup which contains a paste of sulphate of mercury and water. This salt which is *very poisonous* is made by carefully boiling mercury in sulphuric acid. This salt is insoluble in water but in a battery, while the current passes through it, it is broken down into sulphuric acid which attacks the zinc, while mercury is collected at the bottom of the porous cup:

$$HgSO_4+H_2=Hg+H_2SO_4.$$

30. BICHROMATE OF POTASH BATTERIES.

The Grenet battery is shown in Fig. 31. In a bottle of the shape as shown two carbon plates are hung; between the carbons a zinc plate is stationed which may be pulled out of the solution which latter is made of bichromate of potash 48.4 parts, sulphuric acid 42.8 parts, water 200 parts by weight.

The three ingredients may also be used in the following proportions: 250, 550, 1,000, or else 8, 7½, 50 ounces.

The first formula coincides with the following chemical equivalents:

$$K_2Cr_2O_7 + 7SO_3 + 3Zn = 3ZnSO_4 + K_2SO_4 + Cr_2(SO_4)_3$$

Potassium Bichromate + Anhydrous Sulfuric Acid + Zinc = Sulfate of Zinc + Sulfate of Potassium + Sulfate of Chromium

This shows that one has a solution of sulphate of zinc and chromic alum. According to Bunsen one obtains a good electrolyte by mixing 92 parts of *powdered* bichromate of potash, with 94 parts concentrated sulphuric acid. This forms a homogeneous paste and before it becomes solid one adds carefully 900 parts water under constant stirring till everything has dissolved. As a considerable amount of heat is liberated the mixing should be done in an earthenware vessel.

The battery shown in Fig. 31 may be made as follows: A wooden plug to fit the neck of the bottle is first formed. At the lower side one fastens the carbon

Fig. 31

plates by means of the method shown in Fig. 32. The metal piece is made of brass and in as much as the illustrations are clear no further directions are given. After the carbons are in place the metal parts and the points where the carbons are fastened to the metal are covered

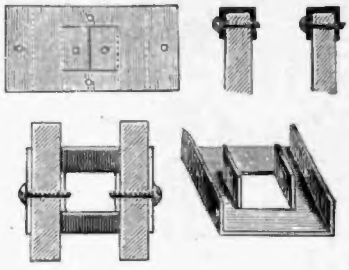


Fig. 32

carefully with several coats of shellac or asphaltum.

The zinc plate—half as long as the carbons—is soldered to a brass rod which goes through the wooden plug with some friction. Contact is made with the rod by screwing an upright spring on top of the wooden plug in such a manner that the spring presses tightly against the rod.

This battery is a very good one and gives strong currents for some time. It gives 2 volts and its drawback is that the

solution deteriorates even if it is not used; the zinc must also be pulled out of the solution when not in use, else it is quickly used up.

An easily constructed battery for the experimenter which gives a very strong current, is made as shown in Fig. 33. On a heavy zinc rod a wire is soldered. Around the zinc rod 2 to 4 heavy rubber (umbrella) rings are slipped; or the rings may be made by cutting off rings of a rubber hose. The carbons (arc lamp carbons) are copper plated on one end. Such carbons may be ready bought from supply houses. A wire is soldered to each carbon and all carbon wires are connected together to one stiff wire, A. A stiff wire, B, is also soldered to one of

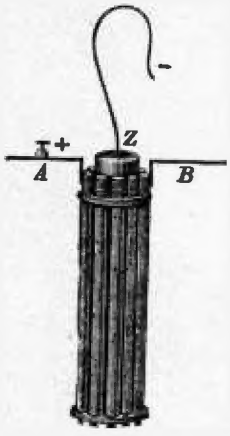


Fig. 33

the carbons. The wires, A and B, rest on the glass and support both elements. Two large rubber rings or bands press the carbon rods to the rings which go around the zinc rod. This makes a very handy battery, giving two volts and from 15 to 25 amperes, using rods about 8 inches long.

CONVENIENCE OF THE WIRELESS.

It is not only when disaster threatens that wireless telegraphy is useful at sea. The utility of the wonderful messenger in a small affair of great convenience to a traveler was illustrated in New York harbor a short time ago when Miss Edith Grinstead, of Eastbourne, Sussex, England, was enabled by its means to hasten her journey homeward from America. It is not often that people in New York harbor witness the spectacle of a passenger leaving an incoming steamship off the Hook and boarding an outgoing liner, but this is what they saw in Miss Grinstead's case, and the story of how it came about is worth telling.

She had sailed from Galveston by the Mallory liner Denver. Her father had prepaid her passage from New York to Liverpool by the Cunarder Campania, and the office of the line in New York supposed that she was to journey by rail to get her ticket, as the call to Sussex was urgent. She found that she could probably catch the Campania by taking the more pleasant sea route. Capt. Young of the Denver had told her that he would be pretty certain to reach this port just before the Campania sailed, but he did not count on bad weather that held them up down the coast nor on delay at Nassau, where the Denver touched on the way from Galveston.

The New York Sun tells the rest of the story as follows:

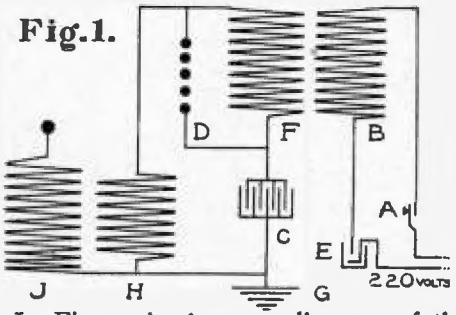
It became apparent that the Denver, which is equipped with United Wireless, could not get up before noon. Arrangements were made by wireless while the Campania was going down the bay and the Denver was coming up the coast. It was decided that Miss Grinstead should leave the Denver and go aboard the pilot boat New York and when the yawl from the pilot boat went out to take off the pilot who had brought the Campania to sea Miss Grinstead should go in the yawl and board the liner by the sea ladder. As she left the Denver Miss Grinstead was cheered by passengers and crew. She boarded the pilot boat and two men took her along side of the Campania when the Cunarder stopped to let off the pilot. An officer lowered a line to the young woman, telling her to tie it around her waist so in case she slipped on the swaying ladder she would not fall. The pilot made the line fast to Miss Grinstead. Miss Grinstead had got from a stewardess a rubber band to put around the bottom of her skirt to prevent the brisk easterly wind from playing pranks with it. Thus, gently hobbled she climbed the sea ladder and was received at the top by two able seamen who lifted her aboard. She was just a bit perturbed, but smiled as the Campania's passengers gave her another cheer.

High Frequency Currents

By Norman Barden.

THE public has been startled and amazed by the fact that a current of such a voltage, so that it will jump from fifteen to twenty inches, can be sent through the human body without producing fatal results. As a matter of fact, if the right precautions are taken there are no sensations produced when high frequency current passes through or over the body. In the following, a few reasons why these currents do not effect the nerves and muscles will be given, as well as a few words in explanation of how high frequency currents are produced.

Fig.1.



In Fig. 1, is shown a diagram of the apparatus used and the connections. It should be said here that there are other arrangements of the apparatus, than the one shown here. The arrangement shown in Fig. 1 has been used successfully at the East High School in Minneapolis. The transformer used was a one and one-half Kilowatt. For the condenser, Leyden jars may be used, but it is best to have a variable condenser as then the apparatus can be adjusted to a higher efficiency. The primary of the Tesla coil consisted of five turns of No. 6 copper wire and the secondary was made up of three hundred and twenty turns of No. 28 copper wire, wound upon a paper tube, nine inches in diameter. The primary turns were large enough to leave plenty of space between it and the secondary. The diagram in Fig. 1 explains itself as to the connections and in Fig. 2 is shown a view of the complete apparatus.

With the use of high frequency current, spectacular as well as instructing experiments can be performed. Among the spectacular experiments is the light-

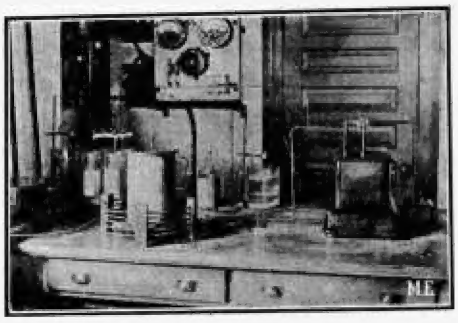


Fig. 2

ing of Geissler tubes. A small Geissler tube will light when brought near the terminal of the Tesla secondary. In theatres, a wire charged with high frequency current is sometimes suspended over the center aisle and the performer lights the Geissler tubes at any place along the wire. At the East High School a tube nearly six feet long and two inches in diameter was exhausted to a high vacuum and brought near the high frequency terminal. The tube lighted very bright from end to end. Then a

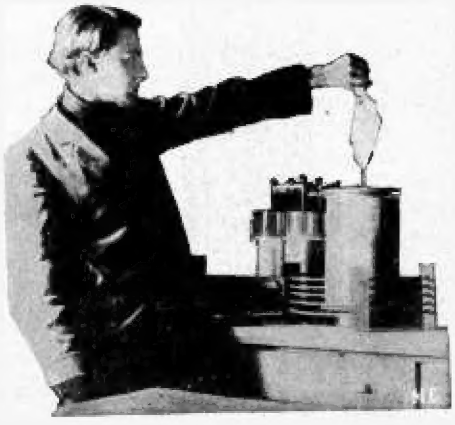


Fig. 3

trifle air was admitted into the tube and the discharge took the form of a straight streamer of light through the center of the tube. Upon admitting more air, the discharge became spiral and so on. In this manner it was made possible to study electrical discharges through the air and

other gases at different pressures. Also if a lamp is connected with one turn of wire, the turn being about eight inches in diameter, and the whole set on the top of the Tesla secondary the lamp will at first show the pearly Geissler effect and then the filaments will grow red and become brighter until they are white. Fig. 3 shows a person taking an eight inch spark from the Tesla coil. The only precaution in this case is to have a metal piece in the hand so that the current will jump to the metal and not to the hand. Severe burns are produced if the spark jumps directly to the hand. The Tesla coil in the act of discharging is shown in Fig. 4. The light of the discharge is highly actinic and is therefore easily photographed.

There are several different theories put forth to explain why high frequency current does not produce fatal results

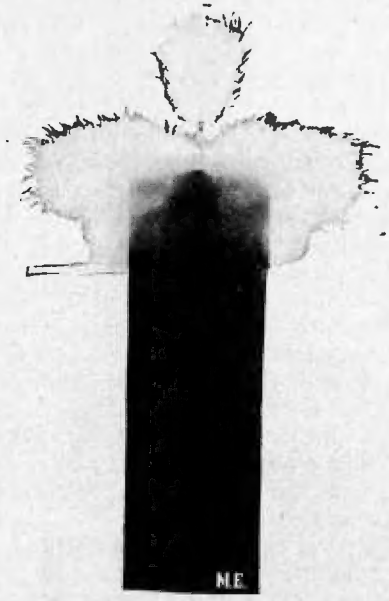


Fig. 4

upon animals and the human body. The theory which is put forth by electricians, has to do with what is known as the "skin effect." It is asserted that the higher the alternations per second, the more tendency electricity has to move upon the surface of the conductor. Now when a direct current or a low cycle current is sent through the body, the current flows through the nerves and muscles and if the current is of enough voltage and amperage, fatal results occur. On the other hand, if the same current be sent through the body at nearly 1,000,000 cycles per second, the discharge runs over the surface of the body or conductor, and therefore no effects are felt and possibly no sensation of any kind. The theory set forth by physicians has to do with what is known as electrolysis of the nerve cells. Thus, when a current, direct or low cycle, passes through the body the nerve cells are disintegrated or decomposed, providing the current is strong enough and consequently death occurs. But when the same current is sent through the body at something like a million alternations per second, the polarity changes so rapidly that the particles of the nerve cells remain stationary and therefore there is very little if any sensation produced. Both of these theories explain why high frequency current does not produce a fatal result, but the first theory discussed is becoming generally accepted. There is a great amount of knowledge to be gained by the use of high frequency current in experimental physics and chemistry as well as from its application in the study of pathogeny.

Explanation of Fig. 1.

A—Switch.
B—Transformer Primary.
E—Electrolytic Interrupter.
F—Transformer Secondary.
G—Ground.
C—Condenser.
D—Multiple Spark Gap.
H—Tesla Primary.
J—Tesla Secondary.

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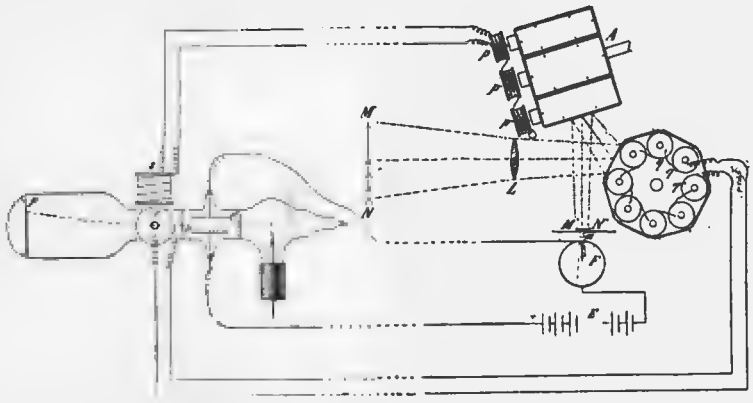
The Rosing Telephot



This new instrument which we are describing has appeared in the German Technical Press, and we are pleased to give herewith the latest improvement of this telephot by the inventor, Prof. Rosing, of the Technical Institute of St. Petersburg.

This apparatus is quite an improvement on previously described similar instruments and its originality should make it many friends.

On the receiving end a Braun tube is used. The cathode rays excite at every given moment a point of the fluorescent screen of the tube, whose position coincides with the light element of the image to be transmitted. To variate the light intensity, Mr. Rosing does not use a selenium cell, but a photo-electric cell, which does not work as sluggishly as the former.

Such a cell is constructed in the main of a glass bulb containing hydrogen or helium, sometimes also, in part, caesium-rubidium, sodium, or potassium-amalgam. Opposite the amalgam surface a platinum electrode is fused into the glass.

When now the negatively charged amalgam surface is lighted, a discharge occurs almost immediately (Hallwach's effect). According to Righi & Stoletow, the intensity of the photo-electric current thus produced is directly proportional to the light-intensity; it also follows accurately the fluctuations of the latter.

Our illustration shows the Rosing arrangement. The sending station is at the right, the receiving station at the left; six wires are necessary to connect the stations. However, the inventor claims it will be possible to bring this down to four.

At the sender the picture, M'N', of the object, M N, to be transmitted is first thrown through the lens, L, on the two Polygon-mirrors, B and A, thence on an opaque screen which has an opening, a. The two mirror arrangements, A and B, rotate around their axes, which are placed vertical to each other. The image, M'N', thus suffers displacements in two directions, which to each other are in the vertical plane; on account of the rotation of the mirror, A, the picture is displaced in a vertical direction with respect to the plane of the illustration, while on account of the rotation of mirror, B, it becomes displaced in a direction lying in the same plane as the illustration.

If now, for instance, the mirror, B, rotates considerably slower than the mirror, A, the combination of the two mirror rotations will produce a zig-zag movement of the picture on the screen in such a manner that one after another all points of the image will act on the photo-electric gas cell, F, through the opening, a, of the screen.

At the receiving station, by means of the two electro-magnets, s and t, which are arranged vertically to each other, the cathode rays of the Braun tube will be displaced by a similar movement, in such a way that each moment the light spot, P, will take a similar position on the fluorescent screen, with respect to the reproduction surface, as the transmitter image-

point takes with respect to the image-surface. For this purpose, the electro-magnet, s, which deflects the cathode rays in a vertical direction (with respect to the plane of the illustration), is connected with the windings, p, of the mirrors, A. The electro-magnet, t, which acts on the rays in a direction lying in the plane of the illustration, is connected with the windings, q, of the mirrors, B. In the specially proportioned windings, p and q, induction currents will be produced by means of the electro-magnets which are placed near the edges of the mirrors. The intensity of these currents is proportional each moment to the rotation of the mirror; the same of course holds true for the magnetic field produced by the electro-magnets, s and t, and therefore the cathode rays and also the fluorescent point on the screen actually move synchronically and isochronically with the movement of the image to the opening, a.

The transmission of the different light effects of the transmitter image-points is obtained by the electro-static action on the cathode rays of the condenser plates, C, arranged in the tube. One of these is connected with the positive pole of the battery, E, the other with the platinum electrode of the photo-electric gas cell, while its light-sensitive surface is connected with the negative pole of the battery.

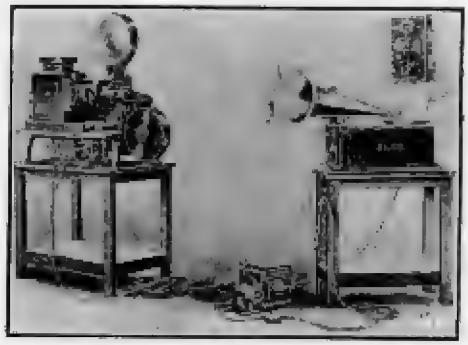
According to the intensity of the light of the various image-points to be transmitted, the condenser will be charged more or less at various times. The cathode rays under the action of the electric field thus produced are deflected downwards in the plane of the illustration.

Between the condenser, C, and screen, a second diaphragm, o, is inserted into the cell. The opening of the latter is so constructed that the cathode rays are shut off when the electro-static field is not excited; only when the condenser is charged, and the rays are deflected more or less, can the latter pass the opening, and thereby produce a fluorescent spot of proportionate intensity on the screen.

In order to correct phase displacements between the deflection and modulation of the cathode rays, one rotates the spool systems, p. and q; a few degrees with respect to the axes, a and b.

GAUMONT APPARATUS.

NOT long ago an apparatus was shown before the French Academy of Sciences which was somewhat out of the usual order. In an adjoining room had been fitted up the new Gaumont apparatus and upon the screen the members of the academy saw M. D'Arsonval, one of their number, delivering an address and could hear his words at the same time, so that the illusion was complete. After this, the apparatus was shown on several occasions in Paris, and attracted much attention. The author had the opportunity of observing it, and the effect is certainly very striking. Speech and singing are shown with all the natural movements, and this is done by means of a very well-devised apparatus. Although inventors on this side of the water have been working for some years past in order to use electric



motors so as to drive a phonograph and a moving picture machine at the same rate, nothing of any practical shape appears to have been brought out. The new apparatus is made by one of the best-known Paris establishments, and has some interesting points. In such a method, it is desired to run one electric motor on the phonograph and a second on the picture machine, and to control the whole from the phonograph, where the operator is stationed. The inventors use two small electric motors of about the same size, running on direct current on the same mains. But the armatures of the motors are divided in a number of sections, and each section of the first motor is connected to a like section of the second motor, so that the first armature can only rotate for a certain

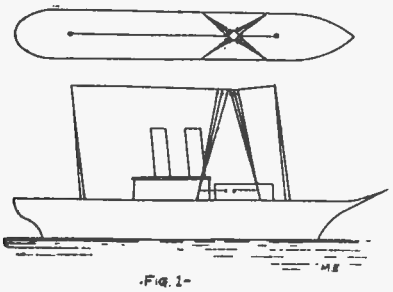
(Continued on Page 161.)

New Bellini-Tosi Apparatus

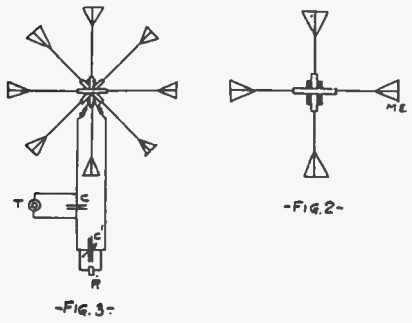
By A. C. Marlowe.

(Paris Correspondent *Modern Electrics.*)

WE illustrate the new form of instrument known as radio-goniometer which the inventors Bellini and Tosi are using in their directed wave system. We have already referred to



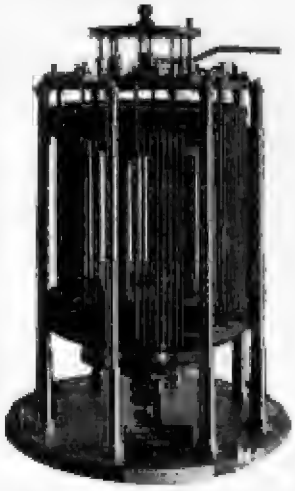
-Fig. 1-



-Fig. 2-

-Fig. 3-

this method in detail in our preceding articles on the subject. The new wireless station on the English channel at Boulogne, France, is now successfully working, and we should mention that recently some interesting experiments were made with apparatus mounted on the French battleship Carnot. On ship-board where space is limited, it is desired to cut down the length of the horizontal wires for the aerial as much as possible, and the present instrument which is of quite recent date allows of doing this on account of the fact that two extra coils are added to the radio-goniometer. In the type which we already mentioned, the instrument contains 2 fixed coils crossed at right angles, within which is the movable coil for directing the waves around the horizon or for receiving. At present there are added two other fixed coils placed at a 45 degree angle between the others. As a result of calculation and experiment, this arrangement will allow of shortening up on the length of the horizontal wire, and for this reason it is very well adapted for work on ship-board. The use of the Bellini-Tosi method on board the battleship is of great interest and it is being followed up by a number of experiments which show that it will be valuable in the future. On shipboard there are used four equal aerials for the ordinary Bellini-Tosi system such as we described before, and these aerials are mounted as our diagram shows. They come together at the top, and at the bottom are connected to the coils of the instrument (radio-goniometer) by horizontal wires. The lower ends of the aerials are fixed on four corners of a square whose diagonals each make an angle of 45 degrees with the boat line. In the present diagram, Fig. 1, the aerials are suspended from a square frame, which is itself hung by a cable stretched between the masts. Fig. 2 shows the method of connecting the radio-goni-



New Style Radio-Goniometer.

ometer coils (fixed coils). Each coil has two aerials. The inner movable coil is connected to the sending or receiving apparatus and by its means we are able to send or receive at any angle by turning it about its centre. The new method is seen in Fig. 3, and here the instrument carries four fixed coils

instead of two. Each coil has a double aerial, so that eight aerials are mounted on board, following somewhat the same plan as above. The inner movable coil turns as before over a graduated circle. It is connected to two condensers, C and C^1. To the fixed condenser, C, is joined a telephone and with the variable condenser is used a mineral detector, R. For the sending, a second radio-goniometer of slightly different make-up, but on the same principle is used and it can be switched on to the aerial when needed.

Bellini-Tosi Aerial on "La Provence"

Several advantages are obtained with this apparatus. When running in fogs, the boat can find its position with reference to a shore station and where there are two shore posts, it can find its absolute position and has much greater security, being able to run faster and make the landing in better time. This avoids disasters and gives an economy of fuel. Collisions between vessels are avoided. For battleships it is valuable in showing the position of shore points or of other vessels.

"WIRELESS" OPERATOR CUTS HIS THROAT.

Arraigned before Magistrate Barlow in the Morrisania Court, New York, on a charge of attempting to kill himself by cutting his throat and wrist in a vacant lot back of Valentine avenue and One Hundred and Eighty-second street, the Bronx, Stephen Roach, forty-three years old, of Derby, Conn., declared that he had received a wireless command to cut himself up.

With the utmost solemnity Roach said: "Your Honor, I am the victim of wireless persecution. I have been a wireless operator for some years, and got so I could take the messages out of the air without the aid of instruments.

"I was walking along the Bronx this morning when the messages began coming. I got out my pad and began to take 'em down. The first one was, 'Beware! Beware! when darkness turns to night.' Then I got a worse one, which said 'Cut your throat, or we will get you.' I thought this might be a joke, but when the messages stopped coming I knew it was all right and went back of the bushes and cut my throat. It isn't much of a cut, but it's the best I could do with a dull knife.

"Do you see this bald spot on my head?" ran on the man breathlessly, "well, if you've got time I'll tell you how I got it."

"Go ahead," said the Magistrate, "I'd like to hear."

"It was on a battleship, Your Honor. I'd been taking messages all day and had crawled into my bunk. A terrible storm came up, and suddenly I got a wireless in the left ear saying "Jump for your life.' I thought I was on the rail, but I was still in my bunk and I landed square on the deck on top of my head. The blow simply drove the hair inside. Then there was another time"——

"I guess we have heard enough," interrupted Magistrate Barlow. "You can tell the rest down in Bellevue, where, I think, they'd better make a test of your sanity."

"I'm sane, all right," said Roach, "if it wasn't for those confounded wireless messages."

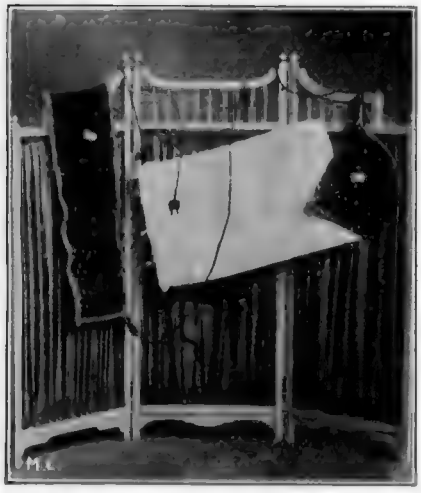
He was committed to Bellevue for five days.

Herrgott Fabrics

By A. C. Marlowe.

Paris Correspondent *Modern Electrics.*

A NEW electric heating fabric has been brought out in France by M. C. Herrgott. What he desired to obtain was a fabric woven in the shape of rugs, coverlets and the like, containing a heating wire woven in along with the wool or other threads, so that when attached to the current the fabrics would give off a moderate and comfortable heat. By a new process he is able to combine a heating wire along with the thread in such way that the heat is very well obtained without any danger of burning. He starts with what he calls the electro-thermic thread. It is made up of a wool thread which serves as a foundation or core,



Electrically Heated Pads Using Herrgott Fabric.

and around it is put on a braiding of very fine nickel wires. The whole is then given a braid of fine wool or other threads, so that the whole goes to make up a textile and heating thread. Of this the carpet or any kind of tissue is woven.

The thread is made up in such way that the textile portion alone stands the strain when stretched and there is no strain on the metal wire, also this thread is very supple and does not buckle in weaving. What is to be noticed is that, owing to the great length of the nickel wire, the whole circuit has a high electric resistance. Like an incandescent lamp, it can be put directly on 100 volts and does not heat up above a certain point. The resistance

Electrically Heated Pillow Using Hergott Fabric.

of nickel is known to rise rapidly with heat, so that should there be a tendency to heat up too much the current is cut down by this rise in resistance, so that a balance is obtained and a standard temperature is reached, about as in an incandescent lamp. One good point about the Herrgott fabrics is that the nickel wires corresponding to each thread lie very close together. Each has to heat but a minute surface, instead of the large surface with which we

Electrically Heated Carpet Using Herrgott Fabric.

are familiar in asbestos fabrics. In this latter case each wire must have a high heat in order to be able to keep such a surface at the right temperature, but in

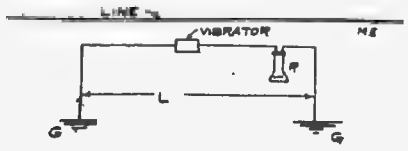
the new fabric the wire needs only to be warmed at a low heat in order to heat the very small part which is allotted to it, so that we have the great advantage of working the wires at a low temperature. It is this point which makes the fabrics very safe and there is no danger of their burning, provided of course that they are always spread out as it is intended. As there is but half a volt or one volt at most between any two neighboring wires there is great security against short circuits. The electro-thermic threads are not carried to the edges of the fabric in weaving, but they stop short at a suitable distance and are thus quite protected against wear.

Such fabrics are likely to come into use as soon as their merits are known, and they form a step in advance in applying electricity to our comfort. We can have soft carpets of any size, foot-warmers, supple and light coverings for chairs, instantaneous bed-warmers and elegant counterpanes in wool, silk or cotton, as well as all kinds of knitted shawls and an endless variety of warmers which can well be imagined.

THE INTERCEPTION OF TELEGRAPH MESSAGES.

By Chester A. Gauss.

It is often desirable in times of war to be able to read the dispatches of an enemy, yet, in many cases their telegraph lines are at a considerable distance or can not be found. The following method, however, can then be put to account. If we take, as illustrated, a very sensitive telephone receiver such as are used in wireless telegraphy and connect it through a vibrating device designed



to rapidly make and break the circuit, to two ground terminals as shown, we can read any telegraph message which may be sent upon a line with a ground return, provided that the legs of the device are a sufficient distance apart. It was found on a small experimental line that, in general, a distance as small as about one-hundredth of the length of the line will suffice for "L" (the distance apart of the grounds of the detecting device), provided the detecting device is set parallel to the line. If at an angle to the line the effect will be diminished, being least when the angle is about ninety degrees. Hence, because of this fact, we can not only read a message but determine the positions of the ends of the line. The action of this device is of course dependent upon the R I drop through the ground and it is similar in principle to the old system of the conductivity method of wireless telegraphy. Considering the results obtained with this early system of wireless telegraphy by Preece, who was able to communicate five miles with the legs of his receiving device fifty feet apart, it is reasonable to suppose that a distance of much less than one-hundredth of the distance apart of the stations will suffice for the distance "L" if this method of interception is tried on a large scale. In fact, the author has heard of telephone messages being read in this manner with the ground connections only a few feet apart.

NEW WIRELESS STATION FOR MARE ISLAND NAVY YARD.

By E. F. Jorgensen.

A complete new wireless station will be in operation on the south end of Mare Island by July 1st. The new station which is expected to perfect the one now in use will talk with the stations along the Atlantic Coast, in Alaska and at Manila. The new station, which is being erected by private contract is to be equipped to break long-range records. The new station will have comparatively high masts, each one being 300 feet in height, in order to carry on its record-breaking feats.

The power of the new station has not yet been determined, but it is expected to excel the 15 kw. station at San Francisco (P. H.) which is now the largest station along the Pacific Coast.

The government station at Mare Island is one of the busiest stations along the Coast as can be judged by the amateurs who listen in for N. P. H.

The Farralone Island's station N. P. I. have recently received a new higher pitched transformer which can be read much more distinctly than the low deep-tone transformer which has been used for the few past years.

Wireless Interferences and Perturbations.*

By J. E. Taylor.

THE working efficiency of a radio-telegraph installation is very greatly influenced by its freedom or otherwise from interferences and perturbations of all kinds.

Interference by local inductive disturbance is avoidable. It is necessary to ensure that there is no electrical disturbance of the radio-telegraph receiver by the operation of the land circuits. Such disturbance may, in the case of Morse apparatus on the land circuit, arise from sparking at relay and key contacts, electrostatic or electromagnetic induction from circuit leads, or from battery leakage direct or via the earthing elements, and direct induction from the external line to the aerial wires of the radio-telegraph plant. To obviate these troubles, telegraph or telephone circuits are led into the station by a short length of underground cable, so that the exposed landline is at least 30 or 40 yards distant from any part of the aerial wire system of the radio-telegraph plant. The landline apparatus and wiring are located in the operating room as remote from the radio-telegraph apparatus as possible, consistent with convenience in having both sets of apparatus manipulated by one officer. The land-circuit ground connection should be made separately to a ground-plate distinct, and separated by at least a few yards, from the main high-frequency grounding system of the wireless telegraph plant.

In addition to inductive disturbance of the wireless telegraph receiver by the landline there is also the reverse action to consider, viz., the powerful electrostatic induction of the wireless transmitting plant on the landline and Morse apparatus. In the case of wireless telegraph transmitters with coupled or closed-circuit excitation, troubles of this kind are not very apt to occur; but if "plain aerial" transmission, or any form of transmission involving precharging of the aerial system prior to disruptive discharge across the spark-gap be used, strong inductive disturbances are liable to be created on neighboring circuits.

Complete isolation of running machinery from the operating-room, preferably by locating it in a separate structure, is desirable to eliminate vibration effects, and battery-charging circuits should be excluded completely from the operating-room.

The consideration of mutual disturbance produced by radio-telegraph stations on one another opens up a peculiarly involved problem. In certain tracts of sea around the British Islands where congested radio-telegraph conditions arise, it is, unfortunately, sometimes necessary, under present working arrangements, to rely largely on "shouting down" interfering stations. Although, under the International Radio-telegraph Convention, the range of wave-lengths allotted for ship to shore working is strictly limited and defined, no radical improvement in working conditions can at present be expected from any system of allotting distinctive wave-lengths for individual coast stations.

Stations in sufficiently close contiguity are liable to powerful electrostatic induction across from aerial to aerial, tending to produce forced oscillations, the effect of which on the receiver it is extremely difficult to annul. This effect decreases very rapidly with increase of distance of separation. It is more pronounced in transmitters of the open-circuit type, in which the aerial system is charged up to a high potential prior to discharge across the spark-gap. The pre-charged aerial method produces an extensive and obtrusive electrostatic field, whilst the electrostatic field produced by the coupled transmitter is negligible in comparison, and can be made wholly unobtrusive in its interference-producing qualities.

Emphasis must be placed on the disability of the station experiencing such interference at close quarters to "tune out" to the necessary extent by dissonance, assuming coupling methods and receiving appliances of the kind required for the efficient operation of a spark system.

*Extracts from paper read before the London Institution of Electrical Engineers.

Interference by pre-charged aerials on distant stations is also of a very pronounced character; this effect cannot, of course, be due to electrostatic induction, but is doubtless determined by the impure character of the waves emitted.

Heavily coupled transmitters give rise to interference both in respect of impurity of wave-train, due to forcing at the transmitter, and in respect of the well-known double wave emission. Lightly coupled spark transmitters have most certainly proved themselves to occupy a premier position as regards elimination of objectionable interference. For ship-and-shore communication, a very light coupling is impracticable, both by reason of the diminution of range and because, if sharp tuning is necessary, there will be a difficulty in getting into touch; calls would be lost, and the communication would lose its utility. Under present conditions of operating coast station services, there are periods during which the "jamming" of the signals of one station by others is so pronounced that confusion begets confusion, and "shouting down" becomes the order of the day.

Regulation of interference at the receiver is a very important proposition. It is unfortunate that complete elimination of disturbance by regulation of the receiving appliances is not feasible, as in that case the difficulties experienced in successfully legislating for the regulation of transmitters would not arise.

In contrast with coupling methods of reducing interference, various plans of divided circuits have been proposed or used in which the impulses conveyed by one branch are annulled by those conveyed by the other, except to the extent necessary for the interpretation of the signals required. In these methods the required signals are "turned in" as against tuning out undesirable impulses. Fessenden's "differential" method and S. G. Brown's "bridge" method are examples of this class.

If the two branches of the divided circuit in the bridge are absolutely symmetrical, all received impulses will divide equally and no effect will be produced on the detector (which occupies a position corresponding to the galvanometer in a Wheatstone Bridge). A very slight disturbance of the balance by shifting the point of the earth-wire connection to right or left will determine signals on the detector from the branch best tuned to the received impulses. If these impulses consist of a sufficiently long train of waves, discrimination is effected between these and any other impulses (even if of the same periodicity) if such other impulses are of a more rapidly damped character. A "valve receiver" interference preventer based on a similar principle has been patented by Marconi.

Transmitters of high sparking rates or intermittency, producing a constant musical note in the receiver, lend themselves to acoustical methods of reducing interference both by reason of the possibility of resonating acoustically to the spark frequency and by the comparative ease with which signals of high and constant periodicity can be magnified at the receiving station. This method appears to have been fully worked out by the Telefunken Company.

The phenomena known in operating parlance as "X's," otherwise parasitic impulses or "atmospherics," present a wide variety of characteristics depending upon the latitude in which they are observed, the season of the year and the time of day. They manifest themselves in the auditive wireless receiver as a series of scraping, scratching or explosive noises of various intensities. They present distinct periodic characteristics in all latitudes, being stronger, more persistent and prevalent during the summer than the winter months, whilst they also present distinct periodic variation connected with the times of rising and setting of the sun, though varying greatly in intensity and prevalence from day to day at all times of the year.

During thundery weather, atmospheric impulses are always very pronounced, and occasionally cripple the working of the coast stations in this country for several hours together or even, in exceptional cases, for a whole day. In the winter months, in this country, these disturbances are rarely strong enough to interfere seriously with traffic, whilst they are sometimes totally absent for days together.

With regard to means of reducing interference due to "atmospherics," no special devices are at present in use at the British coast stations, and it is problematical whether any entirely effective ar-

rangement is possible, for the reason that a rough, comprehensive kind of tuning adjustment is essential at these stations for their normal receiving arrangement or "stand-by" adjustment, in order that calls on a variety of wave-lengths from ships may not be missed. For actual reception of messages, however, the sharply tuned adjustment with variable coupling can be resorted to, and the intensity of disturbance thereby much diminished. Tuning alone does not appear to be by any means a complete solution of the problem, doubtless for the reason that most, if not all, of the disturbing impulses have no specific wave-length or frequency of their own. They appear to be due to sudden changes in the electrical state of the atmosphere (probably in the higher regions), which determine sudden changes in the electrical charges normally induced on the aerial wires. The sudden release or accumulation of a charge will set the aerial system into electrical oscillation at the latter's own periodicity. Hence the futility of tuning them out. That they are reduced by tuning and weak coupling to a greater extent than signaled impulses is doubtless due to the damping factor of the aerial system, which determines a rapid rate of decay and few oscillations for the individual disturbance, whilst the signaled impulses may consist of much longer trains of oscillations.

Wireless "freak" communications are wrapped up in the phenomenon of variations in the transmitting efficiency of the atmosphere. Perturbances in this respect exhibit almost the same characteristics of irregularity as atmospheric impulses. Freak ranges of communication or variations in range of communication occasionally occur by day, but the variations noticed during the night hours are much more pronounced. The sudden veiling or obscuring of distant signals together with the equally sudden "opening out" of signals observed whilst listening on the receiver at a wireless station during the prevalence of this phenomenon is very impressive. These variations of range are not found to synchronize definitely with the periods of atmospheric disturbances, though it may well be that more disturbances are observed when the range extends. The author has, however, observed these remarkable variations in range on nights when "atmospherics" have been conspicuously absent.

GAUMONT APPARATUS.

(Continued from Page 154.)

fraction unless the other armature has also rotated so as to keep up the connection. In this way an exact synchronism is obtained and the phonograph record and the visible image are made to correspond. Means are provided so that both motors will start off by closing a switch. A special rheostat in the motor circuit acts on the speed of both at once, so as to regulate the speech and the pictures at the proper rate. One device which should be mentioned is the method of catching up should one or the other instrument lag behind from any accident. A reversing switch works a small motor special on the second machine which operates a differential gear set lying on the shaft of the main motor, so that throwing in the small motor causes the main motor speed to be quickened or slackened for a short time, until the second machine is brought in step. The operating board is very compact and contains a contact button for starting off the two instruments at the same time, also a voltmeter which serves as a speed indicator, the rheostat for changing the speed of both motors at once, and the operating switch for the small special motor. The general appearance of the new apparatus is shown in our engraving. We hope to give some of the details as to the motors and other points as soon as these are made public.

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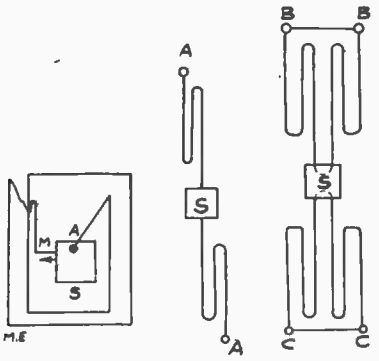
Paris Letter

UNIQUE MEANS TO VARY WAVE LENGTH.

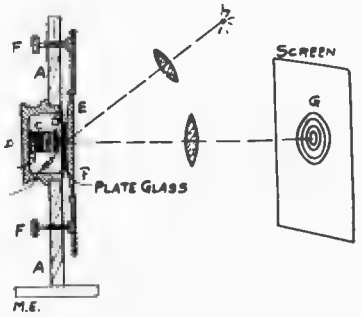
MESSRS. Bellini and Tosi use the following method for varying the wave-length of an aerial. Up to the present, the usual way of changing the wave length is to connect self-induction coils between the lower end of the aerial and the sending or receiving apparatus. This answers very well when it is wanted to change the wave length within close limits, but it is not as well suited when it comes to working with greater variations. If we have an aerial whose wave length is 600 me-



ters, for instance and we wish to work it for 300-meter waves, the wave must be increased from 600 to 900 meters and we must operate so as to use the third harmonic in order to give 300 meters. This requires very large coils and for this reason is not easy to carry out. In the new method there is used a simple and economical connection without self-induction coils. All that is needed is to use a long horizontal wire and run it around the building on insulators. At A is the base of the mast, and the extra wire starts out at M, making several turns around the station and joining on to the aerial at the base. In this way the wave length can be varied by several hundred meters. This can be applied to the Bellini-Tosi directed wave system where the two aerials A and A^1 are used, and a separate horizontal wire is run to the base of each aerial. The wire is run back upon itself in this case. The third diagram shows the use of two aerials in parallel on this principle.

Detector Recorders.

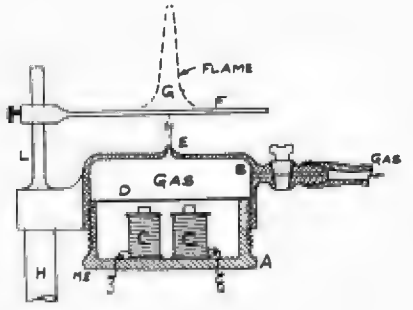
Inventors are at work upon some means of producing visible signals by means of detectors, so that the operator need not keep the telephone always held to the ear. We illustrate two of the latest ideas in this line. A French inventor wishes to make the movement of the telephone diaphragm visible by using the principle of Newton's rings. These are formed when we place two surfaces very near together so as to have a very small space between them, for instance, by placing a convex lens upon a flat glass plate, or very near to it. Changing the distance between lens and plate also modifies the size and color of the rings which are seen. A very simple means is employed for this purpose. A telephone box, B C D, is mounted in a frame and on the diaphragm is fixed a light glass plate, F. Near it is held the lens, E, and the screws, F F, adjust it at a very minute distance from the plate, so that the colored rings appear, and these are projected on the screen



at G by reflection. Seeing that the distance between the line and the plate is quite small, it will be considerably changed by any movement of the telephone diaphragm. When a signal is received the rings on the screen will expand out or contract and also change color, so that this gives a good signal for the operator. Should it be desired to make a permanent record, a photographic paper band can be driven along back of the screen and light is let in

upon it by a small opening. The light changes its position or brightness, so that a record is made on the band.

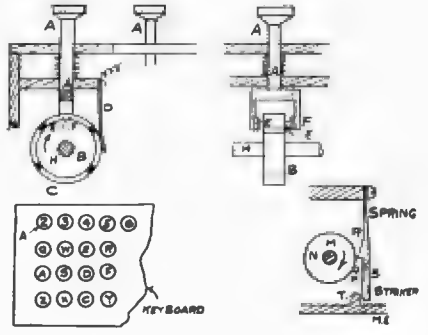
In another method, the movement of the telephone diaphragm is made to vary the size of a small flame, so that a signal is thus produced. On a support, H, is mounted a telephone box which serves at the same time as a gas chamber. The lower half, A, carrying the diaphragm is screwed in so that it can be adjusted by hand in order to change the size of the upper gas chamber, B. A piping at one side brings in the gas, and it escapes at the top through the small hole, E. A special method is used in order to produce a very steady flame, known as the Govi flame. Above the hole, E, is mounted a wire gauze sheet, F, so that the flame is formed above the wire gauze at G. Such a flame is remarkably steady, as is found by experiment. When there



is no action in the telephone, the gas pressure in the chamber, B, keeps constant, and the flame does not vary. Any slight movement of the diaphragm when a signal is received will alter the gas pressure and this will give quite a considerable change in the height of the flame. The operator thus observes the signals quite clearly by this method. As in the former case, a photographic registering device can be very well added if it is needed. Both of the present methods for working with detector are quite practical and can be very easily applied.

Typewriter Telegraph.

Instead of sending Morse signals over a line by a key, a German inventor proposes to use a keyboard for producing the dots and dashes automatically. Each key represents a letter and when it is worked, we produce the proper set of dots and dashes which give the letter. The operator does not need to learn the Morse alphabet, but uses the device in the same way as a typewriter. Such signals are quite the same on the line as where a key is used. The board carries one key, A, for each letter, and it works upon a revolving drum, B. The drum is rotated by clockwork and it carries contacts, C, upon it corresponding to the dots and dashes for that letter. A spring, D, makes contact with the drum. It is desired to give one revolution of the disc each time the



key is pressed, so that all the contacts of the disc, say two dots and two dashes are made, and then the disc stops. On the disc are the pins, E, and the key carries a fork, F, so that the disc is held stopped. Depressing the key for an instant frees the pins from the fork and the disc is freed. The next key must not be pressed before the first disc has finished its signal, and the operator controls this by the click mounted on each disc shaft, shown at M R S T. Thus he can hear when each disc has revolved.

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EDITORIAL.

During 1910 and the first part of the present year practically no advance was made in wireless telephony.

Notwithstanding the fact that thousands are continuously at work on this great invention, we seem to be just as far from the goal as ever.

It may be safely said that the original Poulsen arrangement, using the electric arc to produce undamped oscillations, has not proven a success, nor do we believe that it will ever be used commercially in everyday life. Currents of 220 or 550 volts to feed the arc are not obtainable everywhere, and besides such high currents play havoc continuously with the delicate instruments used in wireless telephony.

The writer has already pointed out in his book: *"The Wireless Telephone,"* that only a wireless telephone operated by a few dry cells can and will be a commercial success. The electric arc system is a mistake, it is uncertain and can never be relied upon; it will break down almost any time in the middle of a conversation. Irregularities in the arc also produce an annoying splutter in the receiving telephone, and this is by no means an uncommon occurrence.

We must then look to the low power wireless telephone. At the present no practical method is known to produce by means of low power, undamped (sustained) oscillations, which are necessary to transmit the human voice. Mechanical arrangements have been tried by the thousands, without avail. Why not turn to electro-chemical means? Perhaps the solution may be found here. Certain gases should also be tried in connection with electrical means for a possible solution.

The next most vital point is the transmitter. This is one of the most important points and the writer does not think that the problem will ever be solved without a high power microphone.

The requirements for a wireless telephone transmitter are the following:

(1) The transmitter must be as sensitive as an ordinary one. (2) It must carry *at least* 2 amperes (better 4) continuously without undue heating and without "frying" or "caking," or losing its adjustment. (3) It must articulate as well or better than an ordinary transmitter. (4) It should only have one vibrating diaphragm and one mouthpiece and should not be composed of several individual transmitters.

A patent has recently been issued to an inventor who uses carborundum inside of the transmitter instead of carbon grains. This is a distinct step in advance. The writer has used flat silicon chips and galena pieces with fair success.

Ralph 124C 41 +

(Continued.)

By H. Gernsback.

RALPH 124C 41, after all the excitement of the last hour, felt the need of fresh air.

He walked up the few steps separating his laboratory from the roof and sat down on a chair beneath the revolving aerial. From down below a faint hum of the bustle of a great city rose up to him. Aeroflyers dotted the sky wherever one happened to glance. From time to time, trans-oceanic or trans-continental air liners would pass the horizon with a maddening swish.

Sometimes some great air-craft would come close up to him—within 500 yards perhaps—and he could observe how all the passengers craned their necks to get a good view of his "house," if such it could be called.

Indeed, his "house," which was a round tower, six hundred and fifty feet high, and thirty feet in diameter, built entirely of crystal glass-bricks and steelonium, was one of the sights of wonderful New York. A thankful city, recognizing his genius and his benefits to humanity, had erected the queer tower for him on a plot where, centuries ago, Union Square had been.

The top of the tower was twice as great in circumference as the main building and in this upper part was located 124C 41's wonderful, research laboratory, the talk of all the world. An electro-magnetic tube elevator ran through the entire tower on one side of the building, and all the rooms were circular in shape, except for the space taken up by the elevator.

124C 41, sitting on top of his tower, mused about things in general. He really had no complaint to make; he had no hard feelings against anyone—only he was paying the penalty of fame, the penalty of greatness. He had everything; he had but to ask and the government would give it to him. His wishes were law.

But,—and this grieved him most—he was but a tool, a tool to advance science, to benefit humanity. He did not belong to himself, he belonged to the government, which fed and clothed him. He was not a free man. He was not allowed personally to make dangerous tests which would in any way endanger his priceless life. The government would supply him with some criminal under sentence of death who would be compelled to make the test for him. If the criminal was killed during the test, nothing was lost; if he was not killed, he would be imprisoned for life.

Being a true scientist to the core, this treatment took the spice out of 124C 41's life. He must submit to anything. His doctors must watch over him day and night, for he must not be sick. He must not indulge in any of the little vices that make life endurable; he must not smoke, he must not drink, he must have no undue excitement—the government would not have it.

He was a prisoner, sentenced for life to invent, to benefit humanity—a bird in a golden cage. Sometimes it became maddening; he could not endure it any longer, it seemed. He would remonstrate. He would call up the Planet Governor, the ruler of 90 billion human beings, and would ask him to be relieved of his work. The Governor would then call in person, and that powerful but kind man would reason with the great inventor until he would see that it was his duty to sacrifice himself for humanity. Twice already the Governor had called on 124C 41, and he knew it was vain to expect a release from him.

After all, he knew he was working for a great cause, and that it was his duty to keep his good-humor and master his weakness.

For some time he sat engrossed in his thoughts, while he watched the air-craft about him. He was awakened from his reverie by the voice of his faithful butler.

"Sir," he said, "your presence in the transmission-room would be appreciated."

"Why, what is the matter now?" 124C 41 exploded.

"It seems the people have heard all

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the details about your Switzerland exploit of an hour ago and desire to show their appreciation."

"Well, I suppose I must submit," the tired inventor dejectedly responded, and both stepped over into the round steel car of the electromagnetic elevator. The butler pressed one of the 28 ivory buttons and the car shot downward, without noise nor friction. There were no cables nor guides, the car being held and propelled by magnetism only. At the 22nd floor the car stopped, and 124C 41 stepped into the transmission-room.

No sooner had he made his appearance in that room than a deafening applause of hundreds of thousands of voices greeted him, and he had to hold his hands to his ears to muffle the sound.

The transmission-room was entirely empty. There was nothing in it except a chair in the center.

Every inch of the wall, however, was lined with large-size telephots and loud-speaking telephone devices.

Centuries ago, when people tendered an ovation to some one, they would all assemble in some great square or some large hall. The some one to be honored would have to appear in person, else there would not be any ovation—truly a barbaric means. Besides, in those years, people stationed far away from the to-be-cheered-one could neither see nor hear well what was going on. ——

It seems that, that afternoon on which our story plays, some enterprising news "paper" had issued extras about 124C 41's latest exploit, and urged its readers to be connected with him at 5 p. m.

Of course everyone who could spare the time called up the Teleservice Co. and asked to be connected to the inventor's trunk-line and the result was the ovation by distance.

Ralph 124C 41 stepped into the middle of the room and bowed in all the four directions of the compass, in order that everybody could get a good look of him. The noise was terrific; it seemed everyone was trying to out-hurrah and out-scream everybody else, and he beseechingly held up his hands. In a few seconds the vocal applauding stopped and some one yelled—"Speech!"

124C 41 spoke a few words, protesting that he did what everyone else would have done, and that he really was not entitled to this ovation. He also added that he did not consider himself a hero for saving the young Swiss lady, as he had done so without in the least endangering himself, which, by the way, was forbidden him by law, anyhow.

Nobody, however, seemed to share his opinion, for everyone began the applause anew and shouted himself hoarse.

Ralph 124C 41 could of course not see all his admirers on the telephot face-plates. There were so many thousand faces on each plate that nearly each face was blurred, due to the constant moving and shifting of the people at the other ends. They of course saw the great inventor plainly, because each one had the "reverser" switched on, which made it possible to see only the object at the end of the trunk line, as otherwise everybody would have seen everybody else, resulting in a blur.

In this case the blurs were in the inventor's transmission-room.

Ralph 124C 41 was obliged to make another speech and then retired to the elevator, the deafening applause still following him.

He then went down in the library and asked for the afternoon news.

His butler handed him a tray on which lay a piece of material *as large as a postage stamp,* transparent and flexible like celluloid.

"What edition is this?" he asked.

"The 4 o'clock *New York News,* sir."

Ralph 124C 41 took the "news" and placed it in a small metal holder which was part of the hinged door of a small box. He closed the door and turned on a switch on the side of the box. Immediately there appeared at the opposite side of the box, on the white wall of the room, a twelve-column page of the *New York News* and 124C 41, leaning back in his chair, proceeded to read as one would read a letter projected on a screen in a moving-picture show.

The *New York News* was simply a microscopic reduction of a page of the latest news, and, when enlarged by a powerful lens, became plainly visible.

Moreover, each paper had 8 "pages," not eight separate sheets, as was the fashion centuries ago, but the pages were literally on top of each other. The printing process was electrolytic, no ink whatsoever being used in the manufacture of the "newspaper." This process was in-

vented in 1910 by an Englishman, and was improved upon by the American, 641, 52 in 2031, who made it possible to "print" *in one operation* eight different subjects, *one on top of another,* as it were.

These eight impressions could be made visible only by subjecting the "paper" to different colors, the color rays bringing out the different prints. The seven colors of the rainbow were used, while white light was employed to show reproduced photographs, etc., in their natural colors. With this method it was possible to "print" a "newspaper" fully 10 times as large in volume as any newspaper of the 21st century on a piece of film, the size of a postage-stamp.

Each paper published an edition every 30 minutes, and if one did not possess a projector, one could read the "paper" by inserting the *News* in a holder beneath a powerful lens which one carried in one's pocket, folded when not in use. To read the eight different pages, a revolving color screen was placed directly underneath the lens, to bring out the different colors necessary to read the "paper."

124C 41, glancing over the head-lines of his *News,* noticed that considerable space was given up to his last exploit, the paper showing actual photographs of the Swiss Alpine scene, which a correspondent had taken while the now famous avalanche rushed down the mountain. The photographs had been sent by *Telcradiograph* immediately after the occurrence in Switzerland, and the *News* had printed them in all the *natural* colors twenty minutes after Ralph 124C 41 had turned off the Ultra-power in New York.

These photographs seemed to be the only thing that interested 124C 41, as they showed the young lady's house and the surrounding Alps. These, with the monstrous avalanche in progression photographed and reproduced in the natural colors, made quite an impressive view.

124C 41 soon grew tired of contemplating this and revolved the color screen of his projector to green—the technical page of the *News*—his favorite reading.

He soon had read all that interested him, and as there was only one hour till supper time he began to "write" his lecture: "On the prolongation of animal life by Π-Rays."

He attached a double leather head-band to his head: at each end of the band was attached a round metal disc which pressed closely on the temples. From each metal disc an insulated wire led to a small square box, the *Menograph,* or mind-writer.

He then pressed a button and a slight hum was heard; simultaneously two small bulbs began to glow in a soft green fluorescent light. 124C 41 then grasped a button connected with a flexible cord to the Menograph, and leaned back in his chair.

After a few minutes' reflection he pressed the button, and immediately a wave line, traced in ink, appeared on a narrow white fabric band, the latter resembling a telegraph recorder tape.

The band which moved rapidly, was unrolled from one reel and rolled up on another. Everytime 124C 41 wished to "write" down his thoughts, he would press the button, which started the mechanism as well as the recording tracer.

Below is shown the record of a Menograph, the piece of tape being actual size.

Where the waveline breaks, a new word or sentence commences; the three words shown are the result of the thought which expresses itself in the words, *"In olden times."* . . .

The Menograph was one of 124C 41's earliest inventions, and entirely superseded the pen and pencil. Anyone can use the apparatus; all that is necessary to be done is to press the button when an idea is to be recorded and to release the button when one reflects and does not wish the thought-words recorded.

Instead of writing a letter, one sends the recorded *Menotape,* and inasmuch as the Menolphabet is universal and can be read by anyone—children being taught it early—it stands to reason that this invention was one of the greatest boons to humanity: Twenty times as much work can be done by means of the Menograph as could be done by the old-fashioned writing, which required a considerable physical effort. Typewriters soon disappeared after its invention, as there was no more use for them, nor was there any use for stenographers, as the thoughts were written down direct on the

tape, which was sent out as a letter was sent centuries ago.

124C 41 had soon recorded his lecture on the Menograph, after which he had supper with his family.

In the evening he worked for some hours in the laboratory, and retired at midinght. He soon went to bed, but before he fell asleep he attached to his head a double leather head-band with metal temple plates, similar to the one used in connection with the Menograph.

He then called for his faithful butler and told him to "put on" Homer's *Odyssey* for the night.

Peter, the butler, then went down to the library on the 15th floor, and took down from a shelf a narrow box, labelled *Odyssey, Homer*. From this he extracted a large but thin reel on which was wound a long narrow film. This film was entirely black but for a white transparent wave-line running in the center of it.

Peter placed the reel containing the film in a rack and introduced the end of the film into the *Hypnobioscope*. This wonderful instrument, invented by Ralph 124C 41, transmitted the impulses of the wave-line direct to the brain of the sleeping inventor, who thus was made to "dream" the "Odyssey."

It had been known for centuries that the brain could be affected during sleep by certain processes. Thus one could be forced to dream that a heavy object was lying on one's chest, if such an object was placed on the sleeper's chest. Or one could be forced to dream that one's hand was being burnt or frozen, simply by heating or cooling the sleeper's hand.

It remained to 124C 41, however, to invent the Hypnobioscope, which transmits words direct to the sleeping brain, in such a manner that everything can be remembered in detail the next morning.

This was made possible by having the impulses *act directly and steadily on the brain*. In other words, it was the Menograph reversed, with certain additions.

Thus, while in a passive state, the mind absorbs the impressions quite readily and mechanically and it has been proven that a story "read" by means of the Hypnobioscope leaves a much stronger impression than if the same story had been read while conscious.

For thousands of years humanity wasted half of its life during sleep—the negative life. Since 124C 41's inestimable invention, all this was changed. Not one night is lost by anyone if anywhere possible, conditions permitting. All books are read while one sleeps. *Most of the studying is done while one sleeps.* Some people have mastered 10 languages, which they have learned during their sleep-life. Children who can not be successfully taught in school during their hours of consciousness, become good scholars if the lessons are repeated during their sleep-life.

The morning "newspapers" are transmitted to the sleeping subscribers by wire at about 5 a. m. The great newspaper offices have hundreds of hypnobioscopes in operation, the subscriber's wire leading to them. The newspaper office has been notified by each subscriber what kind of news is desirable, and only such news is furnished. Consequently, when the subscriber wakes up for breakfast he already knows the latest news, and can discuss it with his family, the members of which of course also know the same news, being also connected with the newspaper hypnobioscope.

(To be Continued.)

POCKET WIRELESS SET.

Pocket wireless apparatus are now the order of the day. Prof. Belar, of the Haiback Observatory, Austria, claims to have invented one which can be carried in the pocket and can be quickly set up so as to receive messages. He tried it on a hill two hundred eighty feet high and could pick up messages from Venice, Munich, and other cities. Another apparatus of the kind is devised by M. Cerebotani, of Italy.

BRIDGETON WIRELESS ASSOCIATION.

A wireless club of amateurs has been organized in Bridgeton, N. J., under the name of Bridgeton Wireless Club. It would like all who desire to become members to write the secretary, S. B. Ashmead, 275 Bank St., Bridgeton, N. J., for membership blanks. All members are required to be members of the Wireless Association of America also.

S. B. Ashmead,
Secretary Bridgeton Wireless Club.

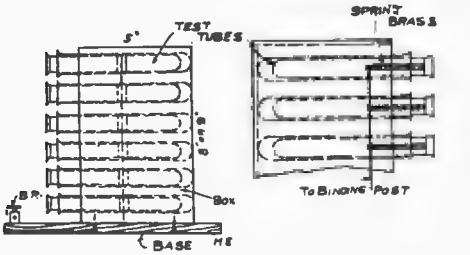
This department has been started with the idea to encourage the experimenter to bring out new ideas. Every reader is welcome to contribute to this department, and new ideas will be welcomed by the Editors. WHEN SENDING IN CONTRIBUTIONS IT IS NECESSARY THAT ONLY ONE SIDE OF THE SHEET IS USED. SKETCH MUST INVARIABLY BE ON A SEPARATE SHEET NOT IN THE TEXT. The description must be as short as possible. Good sketches are not required, as our art department will work out rough sketches submitted from contributors. IT IS THEREFORE NOT NECESSARY FOR CONTRIBUTORS TO SPEND MUCH TIME IN SKETCHING VARIOUS IDEAS. When sending contributions enclose return postage if manuscript is to be returned if not used. ALL CONTRIBUTIONS APPEARING IN THIS DEPARTMENT ARE PAID FOR ON PUBLICATION.

FIRST PRIZE TWO DOLLARS.

AN EASILY CONSTRUCTED VARIABLE CONDENSER.

THE following is a description of my variable condenser which was constructed at home, very cheaply and easily.

First procure twelve glass test-tubes, six of them 6x1 inch, and the other six of a size that will just slip inside these. Cover all the tubes with tinfoil, on the outside only, and make the inside ones fit very snugly, as the closer the tinfoil surfaces are together, the more efficient the condenser will be. Next get a box, eight or nine inches long and five inches



wide by one and one-half inches deep. A cigar box with the lid nailed down and one side taken out will do very well.

Connect the large tubes with a piece of bare wire, making two or three turns around each one, to insure good connections. Space them about one and one-half inches apart. Leave four or five inches of wire to connect with the binding-post.

Now place the tubes in the box and run the wire through a hole in the bottom. Fill the space around them with melted paraffine and space them carefully before it hardens.

The connections to the movable tubes are made of strips of thin spring brass. They should bear pretty hard on the tubes. If the box is stained black and given a coat of shellac, it will be a very good looking instrument.

Secure this on end, to a base about 3x8 inches, and connect the binding-posts.

It is then ready for use.

Vary the capacity by pushing jars in or out.

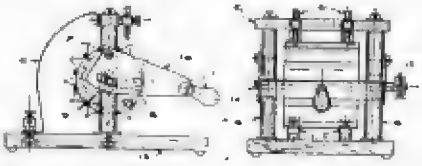
Contributed by

JAMES BITLER.

SECOND PRIZE ONE DOLLAR.

A UNIQUE ROTARY SPARK GAP.

As readers of *Modern Electrics* are now fully acquainted with rotary spark gaps and their good points, a brief description of the parts of this one, will doubtless assist those who might desire to build one. Beginning at the base and working upwards, part 13 is an oak board 7x5x½ inches with drillings for binding posts 1 and 2 and also for screws holding the uprights part 6. The uprights should be of ⅜-



inch round brass, 4 inches long, drilled and tapped at top for hard rubber cross

bar, part 12. A slotted hole is shown in part 6 for shaft, part 14, which is one-eighth-inch steel rod with a pulley part 15, forced on its end. The object of part 10 is to provide up and down adjustment for the rotary wheel, thereby increasing or decreasing spark gap. Part 11 is an ordinary switch handle. Part 10 is made of 1/16-inch brass and cut out as shown in drawing. Part 8 is a wooden block 2¼ inches diameter and 2 inches long with shaft 14 driven into it. Part 7 is No. 22 B. and S. gauge brass sheet corrugated as shown and tacked fast to part 8 with small nails, part 9. Zinc spark plugs are inserted in binding posts which are in turn connected with posts 1 and 2 by copper strips, part 5. To work, connect posts 1 and 2 across secondary circuit of transformer or coil and belt part 15, up to a motor, then move handle, part 11, until maximum current effect is obtained in the aerial wire.

Contributed by

O. A. SCHANN.

A HANDY TESTING CONNECTOR.

The accompanying sketch shows a cheap, quick and convenient binding post for testing coils or any connections which must be made quickly. The binding post is made by coiling

up No. 18 Phosphor Bronze or Brass Spring Wire on an one-eighth inch rod. The bottom coil is slightly bent to hold the No. 3 wood screw, and the top coil is bent as shown to form a small handle. By pressing this handle, the coil opens, allowing the wire to be inserted, and when released, it grips wire very securely.

Contributed by

ALEXANDER WILLIAMS.

A POLARIZED RELAY.

A very sensitive polarized relay can be made from an old ringer movement with very little trouble or work. A ringer of about 1,000-ohms is about the best.

First saw off the yoke at points X and X'. Remove the clapper Q and substitute one about twice as long Y. This one has a platinum point at M.

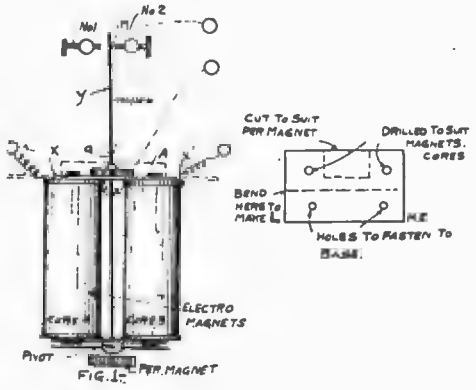


FIG. 1.

The instrument is now mounted on a base. This is done by fixing an angle-shaped piece of brass at A. See Fig. 2. The contact posts, and springs are placed as in Fig. 1. Contact No. 2 is tipped with platinum.

We are now ready to adjust. Turn screws No. 1 and No. 2 until the armature D is equally distant from cores. Now loosen No. 1 about one turn or 1-32 inch. The spring is now made to push, or if on other side, pull, the "clapper" to contact No. 1.

Try a weak cell on the relay. If it does not work reverse the connections of cell. It will be found that the instrument must be connected right in order to throw the clapper from No. 1 over to No. 2.

This instrument is very sensitive as it worked through 1,000 ohms on one cell too weak to register on a volt-meter. It will also work through the body on about three or four cells (new). Any connections, etc., not clear can be made so by referring to Fig. 1.

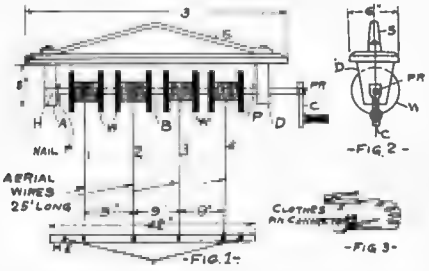
Contributed by

HAROLD L. KESSLER.

LIGHT PORTABLE AERIAL.

For some time there has been great need of a small but efficient portable aerial, and I think the following description will suit the purpose.

The frame is of half-inch oak coated with a weather-proof varnish, the top 3 feet long and 6 inches wide, and the two lower supports, A D, 8 inches long, 6 inches wide, tapering to 4 inches. These supports are screwed from the top very firmly. Next, four wire spools, W, four inches in diameter, four inches long (they usually have a 5/8 inch hole in center), are screwed rigidly on a 5/8 inch round stick,



B, separated at a distance so as to let the four No. 14 B and S aluminum wires 25 feet long fall nine inches apart, as in Fig. 1. Mount this rod, B, on an axis, one end in the hole, H, and the other through the support, D, to a wooden crank, C, 8 inches long.

The wires wound on the spools are now attached to the lower spreader, it being 2½ feet long. Small pins or nails P are fixed immovably in the rod B to keep it from coming loose.

There is a removable pin P-R in the crank so it can be removed when carrying. After the aerial is opened the wires 2 and 3, and 1 and 2, 3 and 4, are connected with clothes-pin connectors (described in previous issues of "Modern Electrics") leading in from wires 1 and 4.

A strap, S, is provided for carrying, making it a small bundle when all wire is wound on spools by the crank.

It is very useful to carry from one house to another, stringing it between two chimneys, putting it up in less than five minutes.

Contributed by JOHN BRADY.

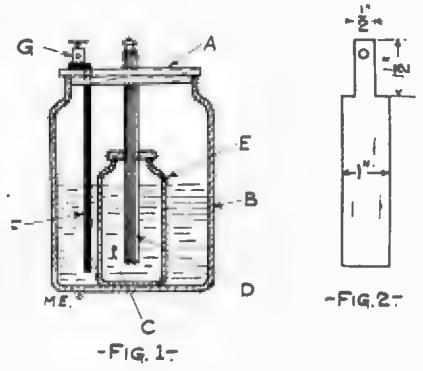
SIMPLE ELECTROLYTIC INTERRUPTER.

Procure an ordinary glass battery jar B-Fig. 1. Next make a wooden cover 1 inch thick, so it will fit snugly over the top of the jar A-Fig. 1. This cover should be boiled in paraffine, or coated with some good insulating material. If this is not done the solution will splash around, and the wooden cover becoming soaked, the current will be short-circuited. Bore a hole in the center of this cover, so it will admit an ordinary round battery carbon D-Fig. 1; also drill a second hole in this cover, so when the lead lug F is put in place it will look as in Fig. 1. The dimensions of this lug are shown in Fig. 2.

It should be just long enough so it will be one-half inch from the bottom of the jar.

Next procure a small thick-walled bottle E-Fig. 1, and drill a hole 1-16 or 1-8 inch diameter C-Fig. 1. This hole should be at least two inches from the bottom. The assembling of the parts are clearly shown in the illustration.

Fill the jar one-half full of solution made of three parts water to one part



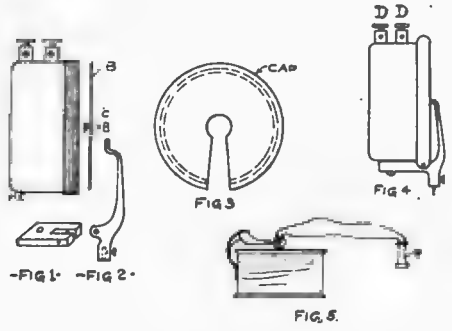
sulphuric acid. This style of interrupter has given the writer excellent results. Using 220 volts A. C., he was able to draw a spark an inch long from a coil whose secondary was composed of three quarters of a pound of No. 32 S.C.C. wire.

Contributed by ALFRED BRETONNEL.

ELECTROMAGNETIC REPRODUCER.

I enclose a few drawings of an electromagnetic reproducer for talking machines which I believe will be interesting to some of your readers. Obtain a telephone receiver of the watch case type, remove the cap and cut a slit about one-half inch wide, as shown in Fig. 3. Then from a piece of sheet iron, cut or file out the vibrator arm, Fig. 2, on the end of which a piece of brass tube is soldered. A small

screw should then be fitted; this serves the purpose of keeping the needle in place. In the steel disk, B, a small hole is drilled in the centre and the screw, C, inserted. Fig. 1 represents a block of brass one inch long by one-half inch wide. Drill holes as shown; now screw on the cap good and tight. The brass block should then be fitted in the slit of the cap. Fig.



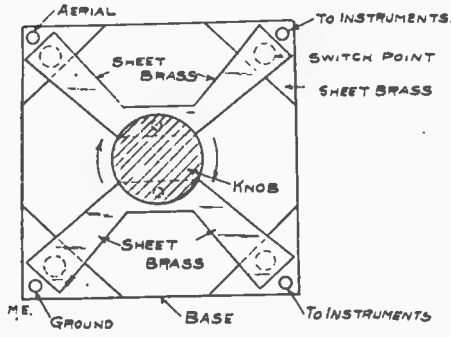
4 shows the reproducer assembled. Now remove the sound box from your machine and put the receiver in its place, which is done easily. Then connect up another receiver to binding-posts, DD. Then put on your record and start the machine. By placing the receiver to your ear the record is loudly and distinctly heard. No batteries are needed as the vibration of the steel disk, B, sets up alternating currents in the magnet coils, which in turn operates the receiver. The sound can be transmitted over wire for many miles.

Contributed by

FRODE JENSEN.

LIGHTNING SWITCH.

As this switch is of simple construc-



tion, no explanation is necessary.

Contributed by

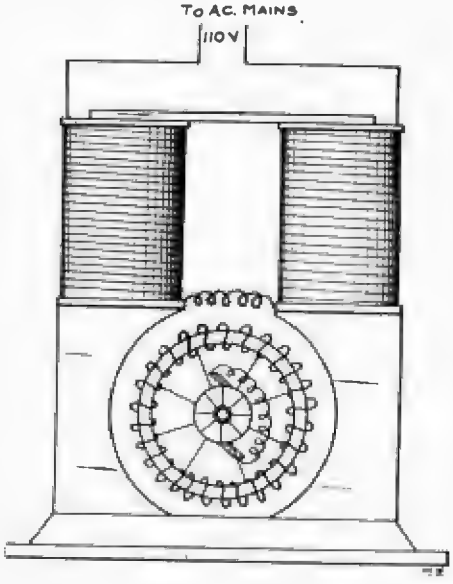
ROBERT H. KAPSINOW.

SMALL A. C. MOTORS.

Small battery motors (series wound) can easily be converted into two different types of alternating current motors and run on an 110-volt lighting circuit by using a lamp bank.

First remove the brushes and connect the two wires leading to them. Then short-circuit all the armature coils and connect the field-magnet wires to the A. C. mains. By giving the armature a quick turn, in either direction, the motor will run.

A better type of motor is the one shown in the sketch. Here the brushes are connected together and the field-magnet wires connected to the A. C. mains. The latter are in no way connected to the armature. The motor used must have a device for changing



the position of the brushes, for in this way the speed of the motor and direction of rotation is controlled. At low speed this motor is very powerful, but as the speed increases the power decreases.

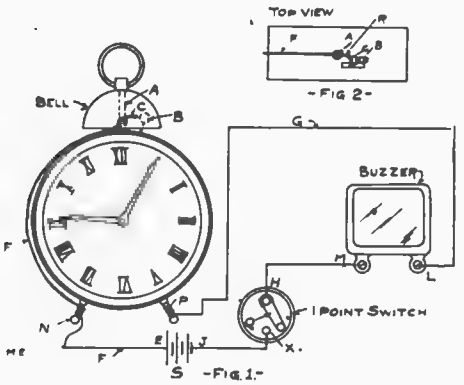
Contributed by

F. B. MILLER.

ELECTRIC ALARM CLOCK.

Take the bell off the clock and wind some covered wire around the bell post, A, three or four turns, and allow some of the wire to extend over the end on the top. Next take this wire, R, Fig. 2, and scrape the covering off of it for at least 3/8 inch, C. Now bend

this wire in the shape that it is in the drawing and be sure that it is bent so that when the clapper, B, comes back it will strike the wire, C. Take the end of the wire that we left unfastened, F, and bring it down the side of the



clock and wind it around the leg of the clock, marked N, and then carry it to one binding post on the battery, S. Now take some more wire and scrape the covering off of it for at least one inch and wind it tightly around the other leg of the clock, E. This wire is G; carry it to a buzzer or bell. (I find that a buzzer works better than a bell) at L. Now fasten a wire at the binding post on the buzzer at M, and carry it to a one-point switch, K, and fasten at H, and also fasten a wire at the point X on the switch and run to the other post on the battery.

If all your connectings are perfect the clock is ready for use.

Set the alarm for the time that you want to awake, and with a match or nail stick it in between the bell-post and the clapper and push the clapper over towards the bell. When this is done there should be a space of at least ⅛ inch between C and B. Your clock is now set, and put the lever, O, of the one-point switch on its proper place. When the alarm goes off, the clapper, B, will come back and hit the wire, C, and cause a contact and the buzzer will start and will keep ringing until the lever, O, is pulled off.

Contributed by

EDW. H. PILSWORTH.

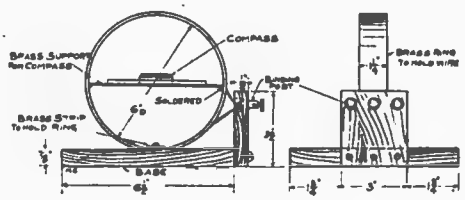
AN ACCURATE TANGENT GALVANOMETER.

The base is made from any well seasoned wood with a slot cut in its center to hold the brass ring which is to hold the wire. The side support is made from some half-inch stuff and should be cut 3½x3 inch. Bore three holes near one end for the binding-posts and fasten it to the base with screws.

The ring is made from some thin brass. Cut a strip one and one-half inch wide and 19 inches long. Solder the ends together and turn one-eighth flange on it to hold the wire on. A strip of brass is soldered across the center of the ring to hold the compass.

The compass must be one with the degrees marked on it, and should be very delicate for the accuracy of the instrument depends upon this.

Wind one layer of No. 18 D.C.C. wire on the ring and take off a tap at the



seventh turn. There should be 20 turns of wire in all.

By lacquering the brass and waxing or

schellacking the wood the instrument can be made very neat.

Contributed by

FRANK L. TYREE.

CLOSED CORE TRANSFORMER.

Having an E. I. Co.'s one-half k.w. coil and an unsatisfactory interrupter of my own make, I changed the open core coil into a closed core type and discarded the interrupter.

The results were entirely satisfactory. I have bridged a distance of nearly

seventy-five miles with it, using an aerial 110 feet in length and 85 feet at each end.

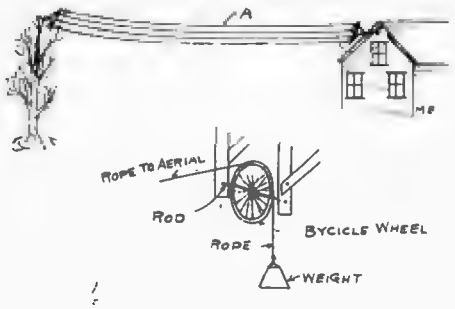
The sketch and diagram are self-explanatory.

Contributed by

RAOUL DUBOIS.

AERIAL SUPPORT.

In the May number I saw the article on "The Aerial Mast" and I thought that it would not be such a good plan having the pulley in the tree and having the weight at the bottom. It would be better to have it inside a building so I bored a hole through the building below the ridge-pole and brought the wire through the hole; then inside I took an iron rod and had it threaded



and put from one rafter to the other and then I took a bicycle rim with the ball bearings in it and put it on this rod and turned the nuts, so that the wheel could not move side-ways. The groove in the bicycle wheel is excellent to run the rope in and the rope will not wear out so quickly as with a smaller pulley.

Contributed by

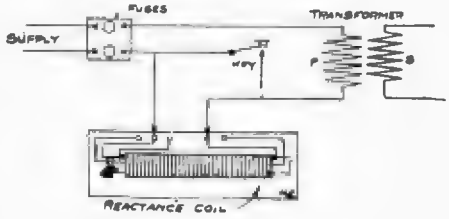
HARRY I. GRANGER.

TO STOP FLICKERING OF LIGHTS.

A very simple way to stop the annoying flickering of lights when sending is by the use of a reactance coil and key connected as shown in the sketch.

A bundle of iron wire No. 22, about 2 inches in diameter and 10 inches long, is wound with 4 layers of No. 14 D. C. C. wire, taps being taken out at each layer. Mount the coil on a wood base and bring each tap to a binding post for convenience in connecting to key.

As will be seen, when the switch is thrown for sending a certain amount of current will flow through the transformer (the amount being determined by the taps used on the reactance coil)



but not enough to cause a spark at the gap. Now when the key is pressed the full line current is allowed to flow through primary of transformer causing a spark to jump the gap.

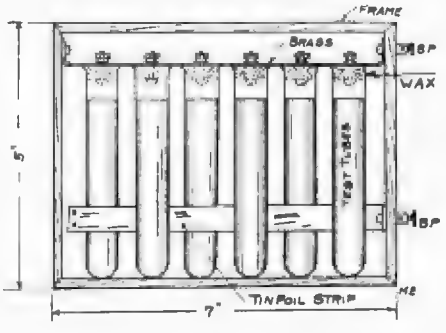
Care must be taken to see that the spark is sharp and quick, not slow and having a tendency to arc, as will be the case if the wrong taps are used.

Contributed by

R. M. PERRY.

SENDING CONDENSER FOR ONE-INCH COIL.

Procure five test tubes. Fill them tightly with powdered carbon from an old dry battery. Insert into the openings at their tops binding-posts, being careful to make good connections. Pour in



enough wax, taken from the top of the battery, to secure them in place. Paste tinfoil over the outer surface of tubes to within an inch of the top. Connect the binding-posts together by a strip of brass in which holes have been made at suitable intervals to screw the binding-posts into

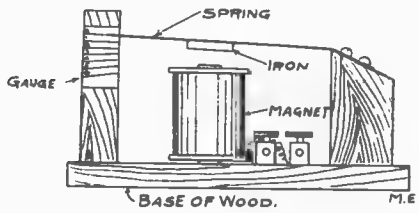
holes. Fasten a binding-post to this strip and screw it onto a frame. Make the other connection to the condenser with a strip of heavy tinfoil woven between the tubes and fastened down by a binding-post at one side.

Contributed by

J. McCLAIN.

A SIMPLE CURRENT GAUGE.

The following shows a simple current gauge which I find works very well. The illustration is self-explan-



atory. A good coat of varnish will add to the appearance of the apparatus.

Contributed by

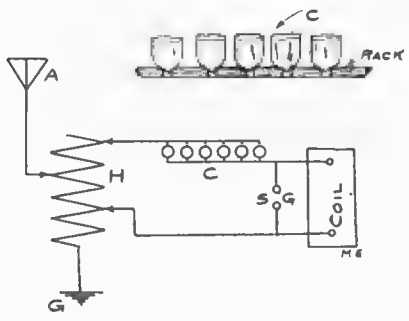
R. J. MIRGELER.

SIMPLE SENDING CONDENSER.

Enclosed find data for making a sending condenser.

First get six old 32 C.P. lamps, a piece of No. 12 bare copper wire and some tinfoil.

With a file make a groove around the globes at the small end, being sure to go through in one place to let the air into the globe. Break the globe from the plug by a sharp blow with an



edged tool. Mount the globes on a frame after covering them with tinfoil.

Now fill the globes with one part of salt and nine parts of water.

Put a piece of the wire in each globe and connect them together.

Connect the condenser as follows and you will have one that will be as good as most bought ones.

Contributed by

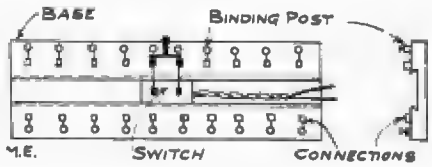
N. C. GOIN.

MULTIPLE THROW SWITCH.

The following shows a plan for making a multiple throw switch.

First the base is made from a board one inch in thickness and about six inches wide. Make a groove in it as shown in diagram, this can be done easily with a chisel. Next cut the switch to fit the groove so as to slide easily. For switch connections use green covered flexible telephone wire. Fasten contacts for switch and then binding posts. The multiple switch is then complete and ready for use.

This switch is useful on a switch-



board. It can have as many contacts as required.

Contributed by

SILEYSHORE PETERS.

A WORD OF WARNING.

I noted two ways to operate electric bells on 110-volt current in your May issue, one in the experimental department and one in the "Oracle" dept. Allow me to say a word of warning.

Either of the two methods is dangerous to use unless special wiring is installed. The underwriters would certainly not sanction its general practice. The ordinary bell wiring (No. 18 D. C. C.) is unsafe to use in carrying line current. To make these methods safe would require regular electric light wiring and switches. In many cases the bell wiring is run in damp cellars and if line voltage is sent through them there is a great danger of "grounds." It is also well to remember that the transformers on the poles are liable to break down. The damage that might be done in this way is very obvious. J

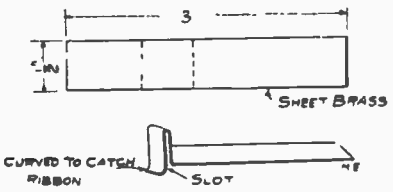
hope that this advice may prevent some of your readers from endangering their buildings by these so-called "Money-Savers."

Contributed by

PHILIP EDELMAN.

HELIX CLIP.

Enclosed you will find a drawing of a clip for helices of the ribbon type. Take a piece of sheet brass three inches long, and one-half inch wide. Three-quarters of an inch from one end bend so it will catch the ribbon, then one-half inch from this place bend again



so as to make a slot for the ribbon to fit into. This will prove to be a very good clip and can easily be made by studying the drawing.

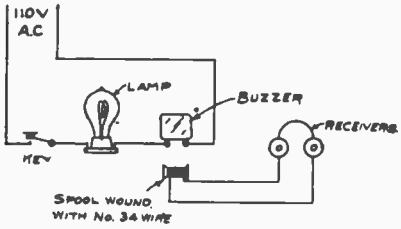
Contributed by

VERNIE DEXTER.

CODE PRACTICER.

Enclosed find a diagram of a simple code practicer.

As the key is depressed a buzz will be heard in the phones if coil is near enough to the buzzer.



The sound may be regulated by moving the coil to or from the buzzer.

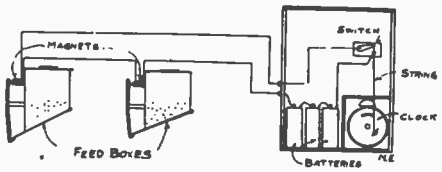
Contributed by

EDWARD V. KOHOUT.

AUTOMATIC CHICKEN FEEDER.

I will try to give the description of a chicken feeder, which will be of value to those who have a little time to spare to make it. First procure a box 4 inches by 12 inches by 12 inches, with a hinged lid. Next an alarm clock and a wood base switch. The clock is fastened firmly in the box but is removable so as to wind it. The switch is screwed down firmly after making connection. A string is fastened from the switch handle to the alarm key on the clock. Now the alarm is set at the time it is desired to feed the chickens and it will wind up the string, thereby closing the circuit.

Now make the feed boxes; they should be made of tin or thin wood, and placed at a distance from the ground in the coop; the dimensions are 4x6 or 3x5 inches. Make the magnet the core of which is 2 inches long by ½ inch diameter. Make two core ends from hard rubber or fiber 1⅝ inches by ⅛-in. thickness and secure these on the end of the core. Wind this spool full of No. 22 insulated wire, leaving enough for connections. Now get a piece of hard wood ½x½ inch; slot this to a depth of one inch, fasten this to the longest side of feed box as shown. Get another piece of wood 4 x¼ inches, fasten this in the slot as



shown so that it can work freely. To the upper end is fastened a soft iron disc ½x⅛ inch, this is to act as armature. At the lower end is cut a notch for the bottom of the feed box to rest in. Note how the bottom is hinged so that when released it falls. The armature should be about ⅜ inch from the magnet core.

The outfit is now complete, the feed boxes are connected in series as shown, and may be quite a distance from battery; the clock pulls the handle across and so opens the circuit. Four dry cells are amply sufficient to operate.

Contributed by

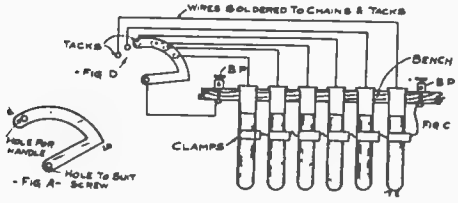
ALLEN A. GRIM.

AN ADJUSTABLE CONDENSER.

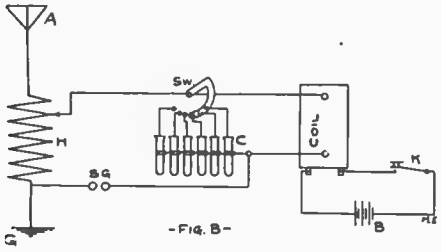
Materials: 6 Leyden jars (test tube type), 6 8-32 binding-post screws with nuts, 6 pieces of sheet copper 1 inch wide and long enough to reach around jar with extra length so as to form a clamp, 6 brass tacks, 6 pieces of chain long enough to reach into jars, 1 piece of brass cut into shape as A and some wire.

To construct: Drill six holes into bench to accommodate jars, but small enough so jars won't fall through.

Put jars into holes, put on clamps and connect all to one terminal Fig. C.



Solder wire onto chain and run from inside of one jar to one brass tack. Do the same with all the jars. Be sure to



get tacks in semi-circle Fig. D. Fill jars with salt water.

Cut a switch as in Fig. A, and see that D to G covers all tacks otherwise it will not work. No dimensions are given because some jars might be larger or more might be used. The connections are shown in Fig. B.

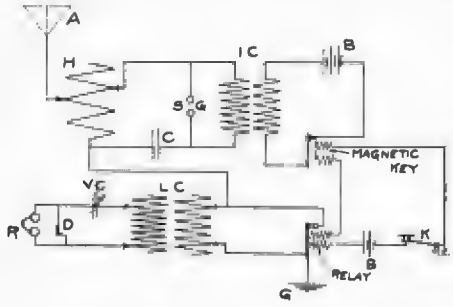
Contributed by

W. SCHURMANN.

BREAK-IN KEY.

The diagram illustrates the connections for a simple break-in key.

Its main advantage lies in the fact



that there is but one contact at the key proper, thus eliminating the necessity of a hard working key, together with a large swing, of which both points are objectionable and unnecessary.

The instruments required are an ordinary telegraph key, a relay, and a magnetic key, the construction of which has been described in previous numbers of "Modern Electrics."

The arrangement seems to work very well and eliminates the trouble of throwing over the control switch at every change from transmitting to receiving and it also affords the receiving operator the opportunity to "break-in" and interrupt the sender as soon as he loses a part of the message through interference, static, or a similar cause.

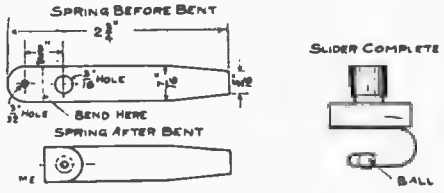
The diagram is self-explanatory and therefore nothing need be said concerning the method of connecting up.

Contributed by

C. W. CARLSTROM.

A NEW BALL-BEARING SLIDER.

The tension of the spring on this slider can be adjusted without taking slider and rod off from tuning coil. The ball is always in full sight and you can readily see if it turns when in use.



Use about No. 22 or No. 24 spring brass and one-quarter inch steel ball. The holes inside of spring strip where ball runs should be beveled smooth. The drawing explains the rest.

Contributed by

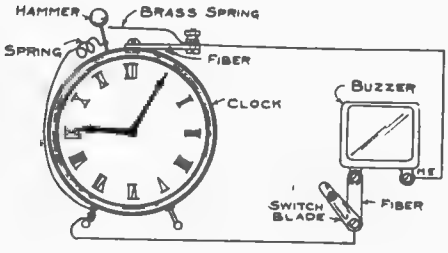
O. J. HURLBUT.

ELECTRIC ALARM.

Some time ago I had occasion to use a time switch in connection with an alarm clock, but on looking through several articles on alarm clock attachments, I was unable to find one suitable. I devised the following attachment, which though very simple, has been doing its work without any trouble for about four months.

Referring to the diagram, the bell was taken off the clock and a piece of fibre attached, with a spring attachment, as shown in Fig. 1. This spring has to be

adjusted to be within about an eighth of an inch from the ringer hammer. A spring of fair strength is also put onto the hammer. This alarm has not to be reset every time it rings. On the buzzer



-FIG 1-

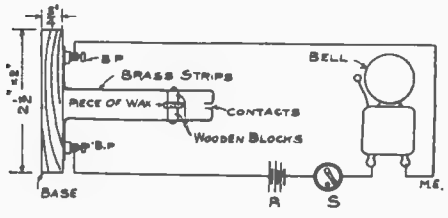
or bell a switch of fibre is put on the binding post, as shown.

Contributed by

ALEX. POLSON.

SIMPLE FIRE ALARM.

Below is a diagram of Simple Fire Alarm, which almost explains itself. The brass strips are 3½x½. The base is 2½x2x¾. It can be put in any place where there is danger of fire. The heat melts the wax which makes the



strips come together, forming a circuit.

Contributed by

RAY. YATES.

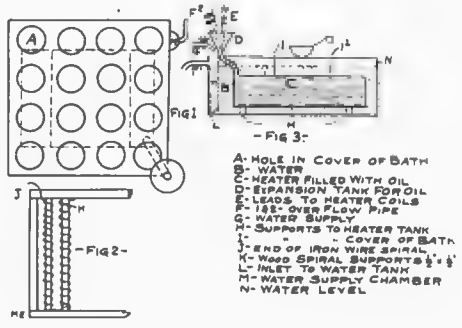
ELECTRIC HEATER FOR STEAM BATH.

The chemical manufacturing plant, where I am employed as electrician, having entirely replaced steam by electric power, found it necessary to provide an electrically heated steam bath for the laboratory. Instead of using a commercial immersed coil to heat same, I designed and made one which is giving excellent results.

Having omitted dimensions on sketch, I will give a short description.

The outside, water box is 28x28 inches and 8 inches deep, made of 8 lb. lead. with the top having sixteen 4½ inch holes burned on.

The heater tank, also made of lead is 21x25x3 inches. This contains the heating spirals which are made of No. 18 tinned iron wire, wound on a mandril ⅝ inch in diameter. I put about 50 ft. in each spiral which, wound tightly, takes about 14 inches on the mandril. These coils were then stretched out on a wood rod to 23 inches. I used ten of these spirals held in place by a wood frame and placed inside of the heater tank which was then sealed up leaving only an opening for a 1 inch lead pipe to bring the leads out through and also to allow for the expansion of the transformer oil with which the tank was then filled.



This tank was set on legs 1 inch high in the middle of the water box and the 1 inch pipe brought out through the corner of the lid and terminated with a funnel-shaped end.

The water box was then filled to a level about 1 inch above the heater tank. and kept so by a small, constant supply of running water into the inlet chamber, as shown in the sketch.

When the "juice" (250 volt A. C.), is turned on, it holds the water in the bath at about 210 deg. F., with the expenditure of less than 1 k.w.

Contributed by

ELVIN F. BROUGH.

INSULATING PLIERS.

I give in the following a device for a very fine insulator for a pair of pliers. All that is needed is a rubber tube about 8 inches long. Cut it in half and put it on the handles of the pliers. After this is done you will find that no metal can touch your hands.

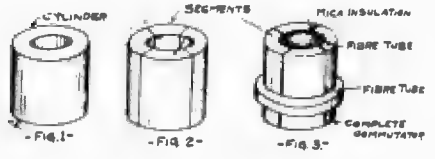
Contributed by

FRANK O'ROURKE.

HOME-MADE COMMUTATORS.

Many experimenters are inconvenienced when building dynamo or motor armatures because of the lack of a particular style of commutator. When winding a ring armature, you like to wind a large number of coils on it, but you often have to limit your winding to suit a standard make of commutator. The higher the number of armature coils wound on a dynamo's armature, the less the generated current will pulsate, and the higher the number of armature coils a motor armature has, the higher its speed will be. I have made several commutators to suit my wants in this line, and would like to help out some readers of "Modern Electrics" in telling how to make any size in general.

To make a commutator proceed as follows: First procure (1) a piece of fibre tubing that fits over the armature shaft snugly, (2) a solid brass rod of the desired diameter and length of your commutator, (3) a short piece of large fibre tubing which fits tightly over the brass rod, (4) and some mica sheet for insulation. Now drill a hole in the center, very accurately (in a lathe) from end to end through the brass rod, so that the cylinder formed



(Fig. 1) fits over the smaller fibre tube. Divide the cylinder into as many equal segments or divisions as required. Mark these divisions with a sharp file and cut the cylinder into its segments with a hack-saw (Fig. 2). File all raw edges smooth. Now cut the small fibre tube an eighth of an inch longer than the segments and mount them on it by separating each segment from another by strips of mica. Now push on a narrow band of the large fibre tubing over the assembled segments, and the commutator is complete (Fig. 3). Turn it smooth in a lathe if necessary. Leave plenty of space for soldering windings to, on one side of the fibre band.

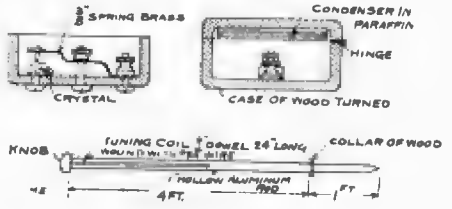
A cheaper but less serviceable style may be made by using brass tubing, or an old brass oil cup, instead of drilling a brass rod. The space between the segments and the shaft may be filled in by a fibre-rod, drilled to fit over the armature shaft. The insulation between the segments may be thin strips of wood, and to increase insulation, soak the commutator in shellac and bake it dry.

Contributed by

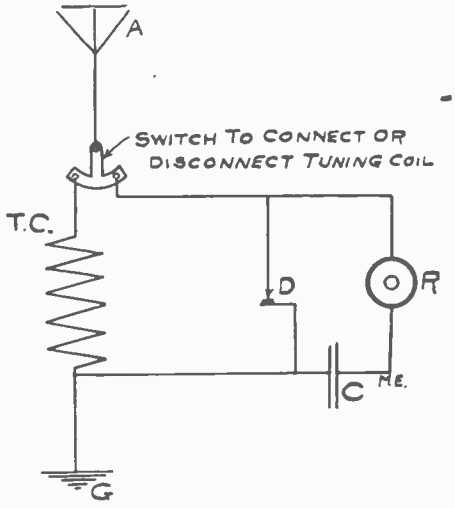
GEORGE STURLEY.

"THE ULTIMATE."

Until some real genius turns out to invent a set to go this one better, I hope that the set herein described will stand "nearest the pole."



The construction of the set is well set forth in the drawing. It consists of a metal cane, containing the tuning coil, a



small case which contains the detector, and a condenser consisting of sheets; a tinfoil or copperfoil separated by some collodion, or better yet, "Healskin," and a switch. The cane does duty as both aerial and ground.

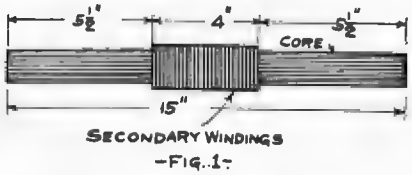
Contributed by

L. O. MUMFORD.

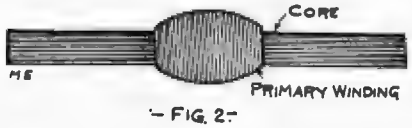
CONSTRUCTION OF A STEP DOWN TRANSFORMER. CLOSED CORE TYPE.

A transformer constructed by the following directions will be found very useful in experimenting, running spark-coil, lights, etc. It is for use on 110 volts alternating current and will cut 110 volts down to 5, 10, or 15 volts.

First procure the core which is made up of enough strips of stove-pipe iron 1¼ inches wide by 15 inches long to make a pile 1¼ inches thick when pressed tightly together. The tinsmith will cut these for you for about 50 cents. Around this core wrap tape or cloth covering a space of 4 inches, 5½ inches from each end. Shellac this tape and allow it to dry. Then wind

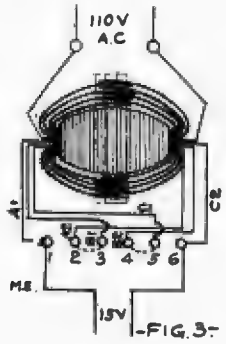


-FIG. 1-



-FIG. 2-

one layer of 50 turns of No. 16 D. C. C. wire over this. See Fig. 1. Then wrap a layer of cloth, which need not be shellacked because the whole transformer will be placed in oil, around this, then another of wire and cloth,



-FIG. 3-

-FIG 4-

and another of wire until you get three separate layers of No. 16 wire of 50 turns each. Over this wrap several layers of cloth. These layers form the secondaries of which there are three separate coils.

Then wind 1100 turns of No. 28 or 29 D. C. C. wire on top of this, winding it so as to make it bulge out in the middle and be narrow near the ends. See Fig. 2. Over this wrap several layers of cloth. This is the primary. All windings, both primary and secondary are in the same direction.

When this is all done and the ends well insulated from the core and each other (soft rubber tubing is excellent for this purpose), bend over alternately, one at a time the strips of which the core is composed so that they overlap and press tight against each other. When you get half of the strips bent, bend the other half in the same way on the other side. Fig. 3 will make this clear. Wrap tape around the whole core to hold the overlapping strips together as shown by dotted lines in Fig. 3.

Then place the whole transformer in a can and bring out the ends, making connections as shown in Fig. 3, using 6 binding posts for the secondaries and 2 for the primary. These binding posts may be placed on a lid, flanged so as to fit tightly in the top of the can and fastened by screws through the sides.

Then fill the can with a good insulating oil (boiled linseed oil) to cover the transformer.

Black enamel will greatly add to the appearance of the transformer.

By connecting the second and third, and the fourth and fifth binding posts with short pieces of wire, 15 volts may be obtained from binding posts 1 and 6. By connecting 2 and 3, 10 volts may be obtained from 1 and 4, or by not connecting any, 5 volts may be obtained from each 1 and 2, 3 and 4, and 5 and 6.

If desired, 100 turns may be wound for each of the secondary coils, thereby obtaining 10 volts from each winding or only one or two secondaries need be wound on.

This transformer may have the primary connected to 110 volt current mains permanently if desired.

Contributed by

HAMPTON R. KLUMBACH.

Wireless Telegraph Contest

Our Wireless Station and our Laboratory Contest will be continued every month until further notice. The best photograph for each contest is awarded a monthly prize of Three (3) Dollars. If you have a good, clear photograph send it at once; you are doing yourself an injustice if you don't. If you have a wireless station or laboratory (no matter how small) have a photograph taken of it by all means. Photographs not used will be returned in 30 days.

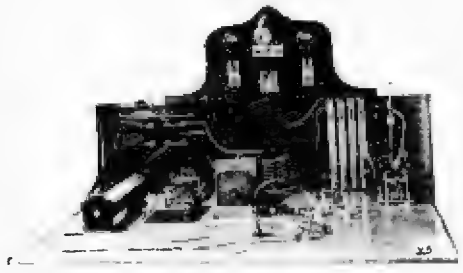
PLEASE NOTE THAT THE DESCRIPTION OF THE STATION MUST NOT BE LONGER THAN 250 WORDS, AND THAT IT IS ESSENTIAL THAT ONLY ONE SIDE OF THE SHEET IS WRITTEN UPON. SHEET MUST BE TYPEWRITTEN OR WRITTEN BY PEN. DO NOT USE PENCIL. NO DESCRIPTION WILL BE ENTERED IN THE CONTEST UNLESS THESE RULES ARE CLOSELY ADHERED TO.

It is also advisable to send two prints of the photograph (one toned dark and one light) so we can have the choice of the one best suited for reproduction.

This competition is open freely to all who may desire to compete, without charge or consideration of any kind. Prospective contestants need not be subscribers for (the publication) in order to be entitled to compete for the prizes offered.

FIRST PRIZE THREE DOLLARS.

I ENCLOSE herewith a photograph of my wireless set from which I have obtained excellent results. The receiving outfit consists of a double slide tuning coil, a loose coupler, detector set and a pair of 3,200 ohm phones. The detector set is a walnut box fitted with a hard rubber top upon which are two detectors (galena and silicon) a double pole, double throw switch, and a small two-point switch for throwing in either of the detectors. All connections are made inside the box, which also contains a fixed condenser. This arrangement is both compact and easy to handle. On the side of the table I have a double pole, double throw switch which throws either the loose coupler or the tuning coil in with the detector set.



The sending outfit consists of a two-inch E. I. Co. coil, a spark gap, four Leyden jars, a brass ribbon helix and a telegraph key for operating the coil. The other key is for the telegraph sounder which is directly behind the detector set. The switchboard has a volt and ammeter (for telling the condition and how much current I am using from an 8-volt—100 ampere storage battery), a pilot light and the necessary switches. A double pole, double throw switch mounted on a hard rubber base throws either the sending or receiving outfit in. The home-made instruments are tuning coil, loose coupler, detector set, helix, condensers and switchboard.

The aerial is composed of four aluminum wires 60 ft. long and 75 ft. high. E. I. Co. electrose insulators are used for insulation.

With this set I have heard distinctly Cape San Antonio, Cuba (U. J.), Colon, (N A X), Key West (N A R), New Orleans, (H B), Cape Cod (M C C) and many vessels on the Atlantic. Have sent a distance of ten miles.

While not a subscriber to your valuable magazine I never fail to read each issue and have learned a great deal on electrical subjects therefrom.

ARTHUR M. HAHN,
Washington, D. C.

HONORABLE MENTION.

This is a picture of the wireless station operated by Mrs. H. H. Birchard at her home, which is on a hill just east of White Plains Avenue, at 241st Street, New York, and one of the high-

est points near the city limits. Her aerial consists of six No. 12 aluminum wires 225 feet long leading to her station from the top of a 75-foot flag pole. The instruments upon her desk consist of variometers, fixed and variable condensers, loose couplers, audion, spark coil, and gap, Leyden jars, and an 80 amp. 6 volt storage battery. To the right of the desk, is a case containing 30 dry batteries, for the high tension side to her audion. Space will not per-

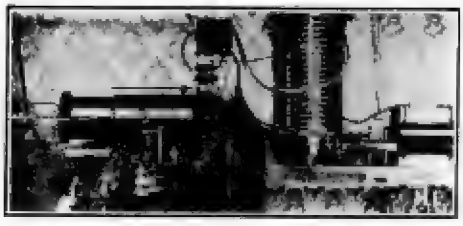
mit me to go into details of her hook-up, which would be interesting to those who can trace it out. Mrs. Birchard is an instructor in the art of telegraphy and is able to do fine work at her station. She considers this hook-up superior to the standard, on account of the ease in tuning out high power stations when copying Cape Cod, or little effort required to tune in other long distant ships or stations.

HONORABLE MENTION.

Enclosed find photo of my wireless station.

Sending consists of two one-half-inch spark, coils, sending condenser, key, vertical spark gap, and helix.

Receiving consists of a loose coupled tuner, fixed condenser, seen just in



front of the loose coupler, electrolytic and silicon detectors, potentiometer and a pair of 4,000 ohm Holtzer Cabot phones.

The instruments are all my own make with the exceptions of phones, key and coils. I use a triple pole double throw slate base switch to change from sending to receiving.

My aerial consists of six aluminum wires, one hundred and twenty feet long, thirty-five feet high at one end and fifty-five feet at the other. With this outfit I have heard San Francisco, a distance of two hundred miles, very plainly, and some ship stations in the Pacific Ocean.

FREDERICK W. SAYLES,
California.

HONORABLE MENTION.

Enclosed is a photograph of my wireless station.

The sending consists of the following: 3-inch spark coil (behind the Leyden jars), helix, spark gap, key, electrolytic interrupter, and impedence coil. I use a modification of the De Forest system.

The receiving: T. P. D. T. switch tuning transformer, loading coil, fixed

condenser, inductance, potentiometer, detector and 3000 ohm receivers. Also a voltmeter, hot wire ammeter and current detector for testing.

The apparatus is of my own construction except the receivers, key, voltmeter and potentiometer.

Since the photograph was taken I have added a variable condenser and another potentiometer.

My antennae consists of the inverted L type, 4 wires (7 strand copper), 3 ft. apart. It is 6 ft. above the instruments at one end and 30 ft. at the other.

Using this antennae I am able to receive from Cape Cod, Wellsfleet (about 200 miles away) every night.

I also receive from Atlantic City, Manhattan Beach and New York.

I have used about a dozen different kinds of detectors but I find a good set of Perikon crystals better than any other.

The photograph was taken while the outfit was on exhibition in a large department store, which accounts for the card above the instruments.

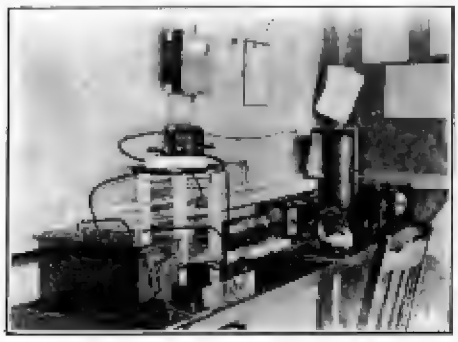
I find "Modern Electrics" an excellent periodical to keep me posted on the researches of other amateurs and the latest wireless news.

L. S. UPHOFF,
Schenectady, N. Y.

HONORABLE MENTION.

Enclosed you will find a photo of my wireless station.

The sending side consists of a 4-inch induction coil, electrolytic interrupter, adjustable choke coil, large key, zinc



spark gap, glass plate condenser, helix, and hot wire ammeter. I use 110 A. C. with the coil.

For receiving I use a loose coupler, large single slide tuning coil, two silicon detectors of the ferron type, three variable and two fixed condensers, a 2,000 ohm head set and a buzzer test.

My aerial is made up of 4 strands of copper, 60 ft. long and 60 feet high, which I can change from a loop to a straightaway.

All my instruments with the exception of the receivers, are my own make. With this outfit I have obtained excellent results. My call is "Q."

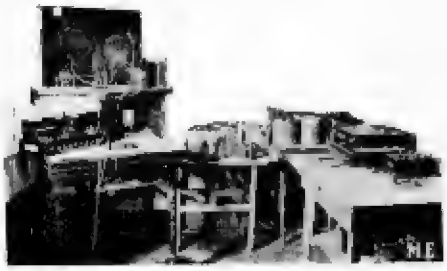
ERNEST J. HEISER,
Ohio.

HONORABLE MENTION.

Please find enclosed photograph of my wireless station.

My sending and receiving sets are both mounted on one stand at the left, except batteries and interrupter on the right.

My sending set is composed of ½-inch coil, glass plate condenser, zinc spark gap, also a rotary spark gap shown at the left, pancake helix made



of sheet brass, heavy wireless key, and electrolytic interrupter.

My receiving set consists of a triple resonance receiving transformer (my own invention), silicon detector, adjustable fixed condensers, a pair of 2,000 and a pair of 3,000 ohm phones.

My aerial consists of four No. 14 aluminum wires 100 ft. long, 70 to 80 ft. high at one end.

My ground is a galvanized pipe 18 ft. in moist earth.

I have made proven tests receiving a distance over 2,500 miles in day time from a 5 kw. station, Aberdeen, Wash.

I have read PX., PA. and PF. working with steamers and Pacific Coast stations, day and night. Los Angeles Examiner, Los Angeles, Cal., and Seattle, Wash.

I constantly hear the Atlantic Coast stations working with steamers.

I have sent 18 miles at night with ½-inch coil, electrolytic interrupter and 110 V.D.C. Have sent 12 miles with same coil using old dead dry cells renewed by my own invention of solution which works wonders on a spark coil. It makes them last six months of hard work.

Directions and information FREE to amateurs. FRED. SHERMAN,
Benton Harbor, Mich.

HONORABLE MENTION.

Enclosed find photo of my station; all instruments are of my own make.

Sending side consists of ¼ kw. and a 1 kw. closed core transformer, helix, 14 turns of No. 6 aluminum wire 1 inch apart, 14½ inches high, 12 inches diameter.

Condenser, 9 plates (7 shown in picture) 15x15 inches tinfoil on both sides. This condenser is used on the ¼ kw. I am building the 1 kw. condenser now. ¼ kw. is shown in picture (part of it) to the right.

The muffler stands on top of condenser, fibre conduit clamped between two oak pieces of wood by the brass rods on side.

All places are sealed with sealing wax where necessary.

Receiving set: Murdock phones; tuning coil; double cylinder, three slides (ball bearing); silicon and carborundum detector. This carborundum is the best that I have come across

yet because when I send, the adjustment is still the same and never is knocked out by sending. If you get the right kind and the right hook-up nothing can beat it (I have the United hook-up) and a small flash-light battery with a potentiometer (which has to be a good one in order to get good results because I find that if too much current passes through the crystal it cuts down the signals).

My aerial is about 60 feet high on a 50-foot house. I have a 12-foot pole, 90 feet long, 4 wires, 20 foot spreaders.

I buy the *Modern Electrics* every month and I am always glad to see that old familiar cover design—at the stationer's store.

CLIFFORD CANNON,
San Francisco, Cal.

HOW IT IS DONE.

THE boy he wants a wireless,
And though his pipe be fireless,
He never spends a cent for smoke:
His comrades say that he is broke.
In an iron box he keeps his coin,
And every day a few more join:—
He keeps the fruits of all his toil
In order to buy a tuning coil.

A detector now is needed bad;
He opens the box with countenance glad
And in he reaches; the sheckles bright
Right in his pocket go, out of sight.
A money order he now must fill,
Before receiving must foot the bill,
And when at last the detector arrives,
He thanks himself with many sighs.

A variable condenser sure would be
A very valuable thing to me.
With it I could tune out that neighboring station,
Be able to talk with the whole population;
I'd copy Cape Cod, I'd get Glace Bay,
I'd know what everyone has to say;
No more I'd hear that static noise:
This would be one of my greatest joys.

At last t'was completed, the receiving set;
The transmitting part was absent yet.
His pay he must save, his passions foil
To save up the cash for a four-inch coil.
When all was saved, he sent away,
Received it soon, I'm glad to say.
But as yet he was not able to tune;
Could he do this, t'would be a great boon.

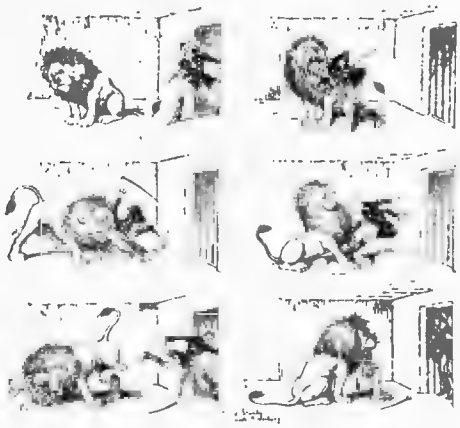
A helix he could easily make,
Two hours or less t'would only take.
The frame he made of fibre tough,
When the wire was wound he had enough.
The clips he made of springy brass;
The insulation was of glass—
T'was almost as good as one just bought
Because he made it, so he thought.

A condenser he could likewise build;
The gap by the spark's now easily filled.
A smaller one around the key
He shunted, to absorb the spark, you see.
Now he sits there, day and night,
Catches the waves in their wily flight.
The fruits of his labors he has gleaned.
And now he's a regular *wireless fiend.*

ANTHONY J. DECKOP.

Flying Sparks

THE INGENIOUS LION TAMER



—and how he foiled the grouchy lion.
—Fliegende Blaetter.

LUNASMS.

"If Manhattan is in New York City, where is electricity?"

"If a watch ticks with its escapement, how does a lunatic?"

"If a hen could lay 6 eggs a day, how many could a relay?"

"If these 'jokes' are dense, is a condenser?"

"If you could not meet your girl, could a potentiometer?"

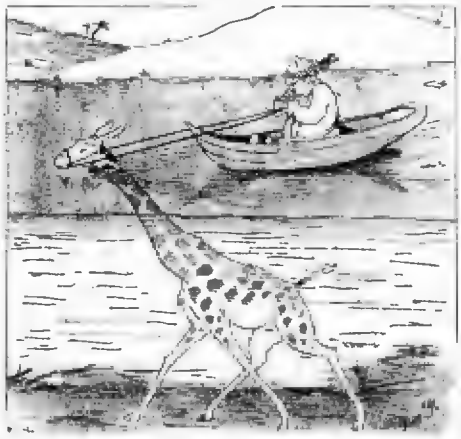
"If your girl don't want to receive you, could a telephone receiver?"

"If an ass is stupid, is carborundum?"

"If you stay late with your wireless, is an insulator?"

—"Fips"

THE CLEVER EXPLORATOR



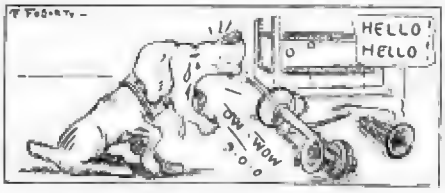
—and how he exploited the unknown river.
—Pêle Mêle.

AN "ATTRACTIVE" RESCUE.

An English "scientist's" idea how it should be done.—Sketch.

DOG LOCKED IN STAND SENDS PHONE CALL THAT BRINGS RESCUE.

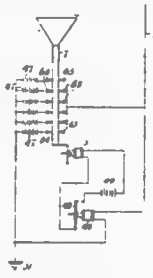
Rover, a yellow dog belonging to Michael Bellotti, was locked in his owner's bootblacking stand in Greenwood avenue, East Orange, N. J., by mistake.



Becoming impatient, the dog scampered around until he knocked over a desk phone. "Central" got the flash, and receiving no answer and hearing strange sounds, told the police, who rescued the dog. Rover in trying to escape had dyed himself black with shoe polish.

Electrical Patents for the Month

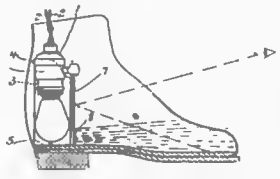
993,024 COHERER. EDWARD J. CLARK, New York, N. Y., assignor of one-half to John Q. A. Whittemore, Newton, Mass. Filed Oct. 29, 1906. Serial No. 341,020.



1. In a coherer the combination of a plurality of terminals, a coherable material, means for feeding the said coherable material to and through the said coherer, means for discontinuing the feeding of the said material while the impulses are not received.

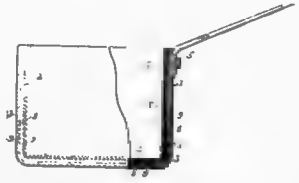
991,391. SHOEMAKER'S LIGHT. CARLOS M. THOMPSON, Stoneham, Mass., assignor, by mesne assignments, to Clifford P. Warren, trustee, Boston, Mass. Filed Dec. 12, 1907. Serial No. 406,157.

A shoemaker's light comprising a casing adapted to be inserted in the heel of a boot or shoe, a source of light mounted in said casing, and a mirror carried by said casing in front of said light, the parts being arranged to permit the light rays to pass below the mirror at a single point and to a point in front of the same, said mirror and



casing preventing the passage of light rays at all other points.

993,314. ELECTRICALLY HEATED VESSEL. HERMAN METTH, Vancouver, British Columbia, Canada. Filed Jan. 3, 1911. Serial No. 600,410.



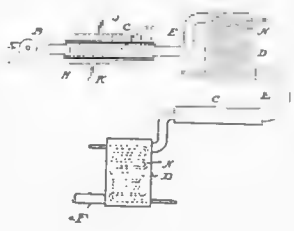
1. An electrically heated vessel which comprises, an inner shell, an outer coating of insulation for said shell, an outer shell in which said inner shell is set, said inner shell being spaced from said outer shell, an inner heat insulating lining for said outer shell and spaced from said inner shell, a heating coil wound around said inner shell within the space between the shells, and a cement filler in said space between said shells to unite the same and embed said heating coil.

991,271. INSULATING-BOARD. SAMUEL CABOT, Canton, Mass. Filed July 22, 1910. Serial No. 573,235.

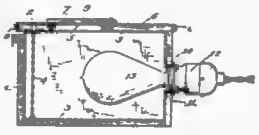
1. The insulating board herein described which is yielding and cellular, composed of a tangled mass of shredded wood, the shreds being adhesively secured together by a viscose solution, and the mass subsequently moderately compressed and dried.

992,829. PROCESS OF DESICCATING AIR. HERBERT T. WESTON, Cleveland, Ohio. Filed Aug. 25, 1909. Serial No. 514,499.

1. The process of treating air for industrial uses, which consists in passing high tension electrical discharges through a flowing stream of air, thereby causing a reduction of the hygroscopic tension of the air, and in then causing said air stream to flow through a closed chamber over refrigerated surfaces therein whereby moisture released from the air is condensed.

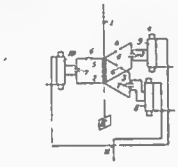


993,965. EGG TESTER. ISAAC DAVIS, Las Vegas, N. Mex. Filed Feb. 9, 1911. Serial No. 607,539.



An egg tester comprising a box having an asbestos lining, a top slingedly connected to said box, said top having formed therein egg shaped openings adapted to receive and support the eggs to be tested, a covering of dark colored fabric arranged over the outer side of said top, said covering having holes formed therein over the holes in the top, covers pivotally mounted on the top and adapted to open and close the openings in the latter and a lamp arranged in the box.

991,837. WIRELESS SIGNALING SYSTEM. SIMON EISENSTEIN, Berlin, Germany. Filed Aug. 25, 1905. Serial No. 275,795.



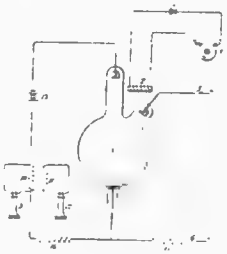
1. In a wireless signaling system, the combination of an aerial conductor having an inductance therein and having an earth plate, a plurality of secondary circuits shunted around said inductance and each having therein an adjustable spark-gap and a condenser, a plurality of transformers, the secondary coils of each being shunted around each of said condensers respectively, and conductors adapted to connect one terminal of the primary of each transformer to a collector ring of a polyphase generator whereby different discharges are caused to take place at the spark-gaps for each phase, the other terminals of said primaries being connected to each other.

993,251. ILLUMINATING SYSTEM FOR THEATRICAL DISPLAY. LOUIS SAMUEL HOWARD, Wichita, Kans. Filed Jan. 7, 1911. Serial No. 601,239.

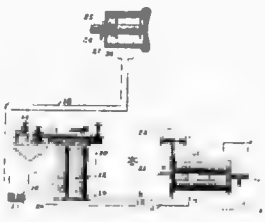
1. The combination with a rope having a pair of wires spirally wound in alternate sections so as to form exposed contacts, of a source of electricity connected to opposite sides of said wires, a series of lights adapted to be carried by a performer, and means engaging said wires so as to make and break the circuit through said lights and said source of electricity.

991,804. MEANS FOR REPRODUCING ELECTRICAL VARIATIONS. PETER COOPER HEWITT, New York, N. Y., assignor to Cooper Hewitt Electric Company, New York, N. Y., a Corporation of New York. Filed July 7, 1904. Serial No. 215,577.

1. As a means for reproducing the variations of current in an electric circuit, an electromagnet subject to the influence of said variations, and a gas or vapor apparatus of the character described located in the field of force of the said magnet, the magnet being placed in such relation to the positive electrode as to cause the variation of the protuberance resistance to be large relative to any variation produced by the said magnet in the vapor column resistance.



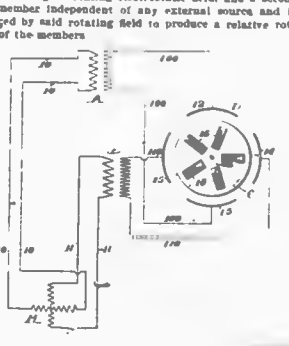
993,442. TELEGRAPHY. JOHN A. EHRLINGER, Washington, D. C. Filed May 23, 1910. Serial No. 562,965.



1. The combination of a sounder with an interacting relay having resistance and energizing coils joined in series, shunt taps from the junctions of the respective coils, an armature provided with break-points, one of said taps leading to one of said break-points, suitable connections with the sounder to the relative break-point for the corresponding tap, said energizing coils disposed to operate said armature, said break-points arranged to control said shunt, substantially as described and for the purposes set forth.

993,561. APPARATUS FOR TRANSFORMING ELECTRICAL ENERGY INTO MECHANICAL ENERGY. HAROLD B. SMITH, Worcester, Mass., assignor to Westinghouse Electric and Manufacturing Company, a Corporation of Pennsylvania. Filed May 14, 1908. Serial No. 432,981.

1. An electrostatic motor comprising a primary member embodying means, energized from an external source, for producing a rotating electrostatic field, and a secondary member independent of any external source and influenced by said rotating field to produce a relative rotation of the members.



Original Electrical Inventions for which Letters Patent Have Been Granted for Month Ending May 30, 1911

Copy of any of the above Patents will be mailed upon receipt of 10 cents

Queries and questions pertaining to the electrical arts, addressed to this department, will be published free of charge. Only answers to inquiries of general interest will be published here for the benefit of all readers.

On account of the large amount of inquiries received, it may not be possible to print all the answers in any one issue, as each has to take its turn. Correspondents should bear this in mind when writing.

Common questions will be promptly answered by mail if 10 cents to cover expenses have been enclosed. We can no longer undertake to furnish information by mail free of charge as in the past. There are as many as 150 letters a day now and it would be ruinous for us to continue acting as a free correspondence school.

If a quick reply is wanted by mail, a charge of 15 cents is made for each question. Special information requiring a large amount of calculation and labor cannot be furnished without renumeration. THE ORACLE has no fixed rate for such work, but will inform the correspondent promptly as to the charges involved.

NAME AND ADDRESS MUST ALWAYS BE GIVEN IN ALL LETTERS. WHEN WRITING ONLY ONE SIDE OF QUESTION SHEET MUST BE USED; DIAGRAMS AND DRAWINGS MUST INVARIABLY BE ON A SEPARATE SHEET. NOT MORE THAN THREE QUESTIONS MUST BE ASKED, NOR SHALL THE ORACLE ANSWER MORE THAN THIS NUMBER. NO ATTENTION PAID TO LETTERS NOT OBSERVING ABOVE RULES.

If you want anything electrical and don't know where to get it, THE ORACLE will give you such information free.

DETECTOR MINERALS.

(965.) Walter Brennan, Mich., asks:

Q. 1.—Would you please describe following minerals: Iron pyrites, carborundum, fused silicon, molybdenite, and copper pyrites? I found a mineral that works very well, but I don't know what it is. It is of a golden color, a trifle dark, and is quite hard.

A. 1.—Iron and copper pyrites have a golden, brassy, dull color. Carborundum usually comes in blue, glassy, sharp crystals. Silicon is gray with a white silver lustre. Molybdenite resembles fresh cut lead a good deal.

Q. 2.—How far can I hear with a two slide tuning coil, 21 inches high, 11 inches in diameter; wound with No. 20 wire; two fixed condensers; one mineral detector; and aerial, 60 feet at one end, 20 feet at the other end, and 70 feet long; No. 14 aluminum wire, four strands?

A. 2.—You do not tell what other instruments you use, consequently we cannot tell.

ELECTRIC HARMONICA.

(966.) A. J. Allard, Va., asks:

Q. 1.—In your December, 1909, issue, Fig. 3, represents the well-known electrical harmonica, of which I wish to know how thick, wide and long are the steel prongs H, and what size wire to use in magnet E. Can I not use separate horseshoe magnets as a permanent magnet N. S., indicated in *Modern Electrics?* This is the main point I wish to know. Can I not use some kind of oscillation high frequency transformer connected in series to increase the alternation current in the line, so the receiving station will have more E. M. F.?

A. 1.—We have no exact data on this piece of apparatus on hand but would venture to say that the magnet which must be one piece should be about three to four inches long and about 1½ inches high. The steel prongs "H" may be taken from a music box and must of course be of steel. We would recommend using No. 30 wire S. S. C. on a magnet. It is quite necessary that "N" is one piece.

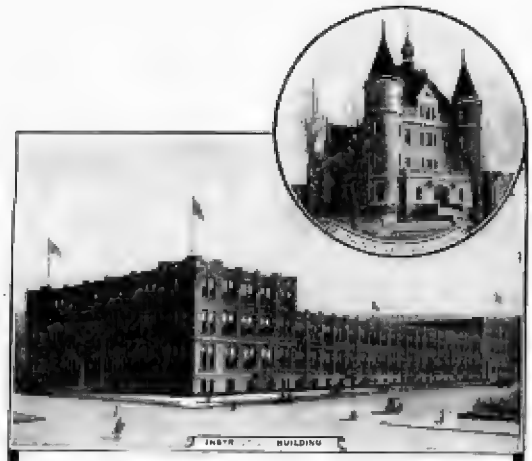
You could of course, use an oscillation high frequency transformer to increase the alternations but this will of course depend on what you want to use the apparatus for.

STATIC PHENOMENON.

(967.) Eugene F. Naegele, Mont., writes:

Q. 1.—In this month's issue of *Modern Electrics,* which I received today I noticed the answer to my question sent to you some months ago. I have wired my instruments according to the diagram furnished and find that I have most excellent results, being able to heard a 5 k.w. station 900 miles away. My aerial is composed of four No. 12 B. and S. gauge copper wire, the wires being 3 feet apart and 450 feet long. One end is supported by an old chimney 115 feet high and the other end is fastened to a telephone pole 35 feet high. I wish to thank you for your kind answer.

I noticed a peculiar thing the other day while putting some new wiring in a shop that was using 500 volts. The 500 volt wires were on a side wall where dust settles, and were running parallel to one another and supported on standard porcelain knobs. When the wires were put in they were No. 12 asbestos covered and of course, white. Now the peculiar thing is that the positive wire catches the dust and is black and the negative wire remains white as when put in. The dust can be rubbed off the positive wire and is white beneath, but why is it that the one catches dust and the other does not? Since then I have noticed the same thing on other 500 volt D. C. wires subject to dust and exposure. Both wires are exposed to the same temperature conditions, etc. I have called an electrical engineer's attention to it but he says he never saw anything similar to it and cannot account for it. This



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Electric Lighting	Mechanical Draftsman
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Dynamo Foreman	Contracting and Building
Dynamo Tender	Architectural Draftsman
Wireman	Plumbing & Heating
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does not happen with the 110 volt lighting circuit, which is A. C. The 500 volt circuit is on an ungrounded circuit being on an entirely different generator that the street car service is supplied with. I would like to know if you can find a reason for this, not because it is going to do me any material good but it is just for my wanting to know, having never seen anything so peculiar before.

A. 1.—The phenomenon which you describe is quite common, and is especially noticeable in flour mills, and places where there is very much dust. The high tension wire electrifies the air the same as a static machine does, and the dust usually collects on the positive wire.

SPARK RECORDER.

(968.) Burns Dick, Watsessing, N. J., asks:

Q. I wish to record the exact position at which a spark occurs, on a sheet of paper lying on a metal plate, which plate, forms one end of circuit: Name some method or chemical with which paper can be treated which will give a clear impression. Or some kind of paste or paint which can be smeared on might do. Record need not necessarily be permanent but must be cheap and quick, and not require subsequent developments as in photograph.

A. 1.—You may use ordinary pole test paper or litmus paper, or tumeric paper. This should be moist when used. The spark will usually leave a red mark, and the wire from which the spark jumps to the plate should be negative.

WIRELESS QUERY.

(969.) Leslie W. Parker, Vermont, writes:

Q. 1.—My aerial is sixty feet high at one end and forty-five at the other. It is composed of three telephone wires stretched 18 inches apart. My lead-in is from the highest pole and runs a distance of forty feet before entering the station. The aerial is one hundred-ten feet long. Now what is the receiving distance and meters wave length with the above aerial and the following instruments? Silicon detector, fixed condenser, variable condenser, 1,000 ohm receiver, and double slide tuning coil composed of 220 feet of No. 20 bell wire? I also have a long water pipe for a ground.

I have a friend who lives a mile and a half away, who has a one inch coil. He takes his current from the street light power. Last Sunday when I was listening I could hear him very plainly by using only one slide on my tuning coil and having the ground end of coil open, running ground wire straight to fixed condenser.

I then grounded the end of the coil, but could not hear a sound. I then tried using both slides but could not hear. Now what was the reason that I could not hear when my coil was grounded or when using both slides?

My friend is located in a deep valley and I am on the top of a high hill. His aerial is the same as mine only that he has five wires instead of three.

How can I better the range of my outfit?

A. 1.—We should roughly say that the wave length of your aerial is between 125 and 135 meters. Without telling something more definite about your connections it will be quite impossible to give you the reason of the occurrence. We should venture to say, however, that the reason may be found that you were receiving inductively when the ground was open and your aerial probably was short-circuited with the ground, as soon as you put the ground on your tuner.

BICHROMATE BATTERY.

(970.) Joe Scalco, Ala., asks:

Q. 1.—Please give directions for making five (5) quarts of solution for use in a bichromate battery. Does the above battery give steady current? What is the voltage of each cell?

A. 1.—See this month's *Practical Electrician*, which gives several very good formulas. Bichromate cells give 2 volts.

Q. 2.—Can common zinc pencils as used in sal ammoniac batteries be used for the zincs in the above battery if a sufficient amount is used?

A. 2.—Yes. Any kind of zinc, which, however, should be amalgamated.

Q. 3.—Can a common magneto machine, used to give shocks, be rewound to make it give a current of about 6 volts and 2 amperes? If so, give directions for same.

A. 3.—By rewinding an ordinary magneto generator, you will get A. C. current. If you desire to have D. C. current, you must use a commutator mounted on the axis. We should judge that by using No. 24 enamel wire you could get about 6 volts and 2 amperes, providing your magneto is of standard make.

UMBRELLA AERIAL.

(971.) E. B. Wagner, Pa., asks:

Q. 1.—I am desirous of erecting an umbrella type aerial on the roof of my house. The roof is 22 ft. square and the pole will be constructed of galvanized iron rain-spout and be fifty feet high. I expect to use the four top guys as part of the aerial system and would like to know how many of these should be used. Would the gain in efficiency, if any, warrant the additional expense of copper spout?

A. 1.—We would not advise you to use any part of the mast for aerial as it will give rise to interference. We would not advise using the copper spout.

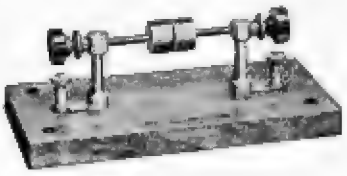
WIRELESS QUERIES.

(972.) Ed. A. Oehrle, Mass., writes:

Q. 1.—Can I get messages on insulated wire? How can I make a silicon detector? Does the thumb-screw need to have a point? Which is the best cleaner for silicon?

A. 1.—You can certainly get messages on insulated wire. It does not make any difference whether the wire is covered or bare as either way gives satisfaction. Ether waves, the same as light waves, go through a solid pane of glass. On silicon detectors the screw should have a blunt brass point. Silicon should be cleaned with alcohol or gasoline when greasy. Description of a silicon detector may be found in the May, 1911, issue.

MURDOCK
WIRELESS APPARATUS



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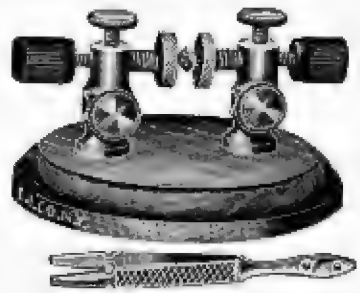
WIRELESS



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BATTERIES FOR WIRELESS.

(973.) Ray C. Armstrong, Ill., asks:

Q. 1.—Can wet batteries be used on a receiving set? If so, how many and what kind?

A. 1.—Any kind of batteries can be used on a receiving set, and if you intend using them with an electrolytic detector about four wet cells should be used.

Q. 2.—What is the kind and amount of wire used on Electro Importing Co.'s "Loose Coupler" (Secondary and Primary)?

A. 2.—Primary, No. 21; Secondary, No. 28 B. & S. enameled wire.

Q. 3.—If a 50-ohm telephone coil is used with a 75-ohm receiver will it make it amount to 125 ohms?

A. 3.—If connected in series, yes.

5 KW. TRANSFORMER.

(974.) Harold Buymer, Ohio, asks:

Q. 1.—I am constructing a 5 kw. transformer and I have soft sheet-iron for the cores, etc., all that I have to get now is the wire. How many pounds on secondary and how many on primary?

A. 1.—For primary 26 pounds No. 8 D. C. C. wire; for secondary 60 pies ¼ inch thick wound with No. 26 D. C. C. wire.

Q. 2.—Is enameled wire the best on a 5 kw.?

A. 2.—Enamel wire may be used if desired, it has the best insulation.

Q. 3.—How far will this send?

A. 3.—This depends upon aerial, helix, etc., but under good conditions, you should transmit about 900 to 1,000 miles.

½ KW. TRANSFORMERS.

(975.) O. Donn Burton, N. J., asks:

Q. 1.—I have a ½-kw. transformer and an E. I. Co.'s ½-kw. transformer coil. Can these be connected together so as to give more than ½ kw., and if so, how? Will an interrupter be necessary?

A. 1.—The E. I. Co.'s transformer coil is open core and cannot be used in connection with a closed core transformer. You can only connect the two together if both are open core. If they are open core, you will have to use an electrolytic interrupter in connection with same.

2½-INCH COIL.

(976.) A. F. Kersey, Va., writes:

Q. 1.—Please give data for 2½-inch spark coil. Is it better to use D. S. C. wire for primary?

A. 1.—Length of core 7½ inches, diameter of core ¾ inch, Empire cloth insulation over core. Wire, 16 D. C. C. wire, 195 turns, using 7 layers empire cloth for insulation over core. No. 36 enamel wire for secondary; 1¼ lbs.; made in 4 pies 2¾ inches diameter; condenser should have 18,000 square inches tinfoil.

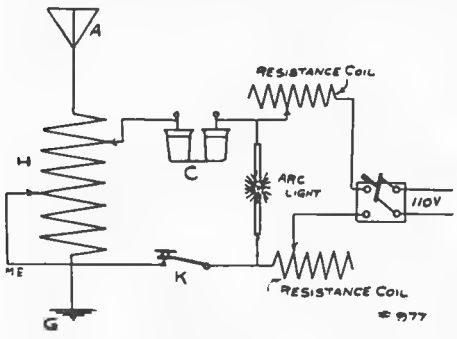
ARC LAMP WIRELESS.

(977.) Jas. Leroy Hodges, Miss., asks:

Q. 1.—Please tell me if I could use the hook-up shown in diagram for transmitting wireless telegraph messages. The arc lamp is hand feed. If not, what changes should I make so as to use it for the above purpose?

A. 1.—Your scheme is perfectly feasible

and you should be able to send messages over quite a little distance with the outfit. An



electrolytic or peroxide of lead detector should be used at the receiving side.

WIRELESS QUERIES.

(978.) J. Robert McCormack, Pa., writes:

Q. 1.—I would like to have the following questions answered:

First—Is roofing tin suitable for the plates of a variable?

A. 1.—Yes, if perfectly flat. Aluminum or brass is, however, to be preferred.

Q. 2.—What will be the range in winter and summer of the following set: loose coupler, primary wound, with ½ lb. No. 22 enameled wire; secondary, ⅛ lb. No. 30 enameled wire, connected to 10-point switch; variable condenser, 15 tin plates, size 5x7; fixed condenser, 24 sheets tinfoil, size 3x4; electrolytic detector; pair "electro" professional phones and potentiometer—if used with an aerial 30 ft. high, 60 ft. long, consisting of 4 strands No. 14 al. wire 18 inches apart; if used with 8 wires 30 ft. high, 60 ft. long; with 4 wires 50 ft. high, 60 ft. long?

A. 2.—You should be able to receive about 400 to 500 miles at an average.

Q. 3.—Would a loading coil containing 1 lb. No. 24 enameled wire increase the range? If not, how can I increase it?

A. 3.—A loading coil would increase your receiving distance if your aerial is not tall.

SPARK COIL QUERIES.

(979.) Earl P. Prince, Texas, writes:

Q. 1.—Is the following design of a wireless coil of proper dimensions? Core 16x1¼ inches, No. 22 B. & S. gauge iron wire, primary two layers No. 12 D. C. C., hard fibre tube insulation, ¼-inch wall, secondary No. 30 enameled wire, wound into 48 sections, ¼ inch thick, 2¼x5 inches, each section to be boiled in pure paraffine and wrapped with linotape, using empire cloth at ends of coil. The whole is to be immersed in boiled linseed oil and used with an electrolytic interrupter on 110 volts A. C.

A. 1.—We can see nothing wrong with the construction of your coil and if the insulation is right and the winding done properly, you certainly could use this in connection with an electrolytic interrupter on A. C. current.

Q. 2.—How many pounds No. 30 wire will I need and what will be the current consumption?

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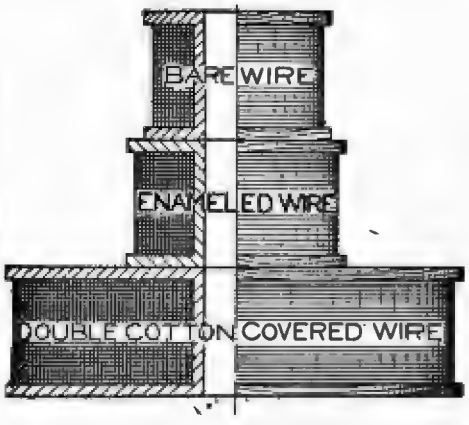

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A. 2.—It is hard to say what the current consumption would be as we know nothing of your interrupter, but it should not be more than 5 amperes or else the coil will heat unduly. 5 or 6 lbs. of secondary wire will be required.

Q. 3.—Under ordinary conditions, what distance will this coil transmit with properly tuned circuits and an aerial 70 ft. high and 85 ft. long, compromise type?

A. 3.—If this coil is properly made, it may transmit up to 60 miles and perhaps further.

WIRELESS APPRENTICESHIP.

(980.) Eldeen M. Doane, Ind., asks:

Q. 1.—I have studied wireless and read your magazine ever since it started and I desire a little information on the following subject: Is there anywhere in the radius of 200 to 500 miles of Chicago a wireless instrument factory where I could apply for a position or take up an apprenticeship to learn the business thoroughly? If there is such, kindly advise me as to where they are.

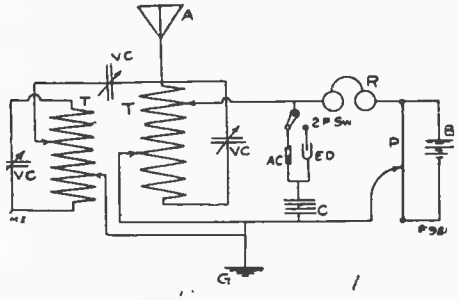
A. 1.—Most all wireless instrument people are advertising in *Modern Electrics* and we ask you to look over our advertising columns and apply by letter to them. Most concerns are always on the lookout for good young men.

CONNECTIONS.

(981.) Walter F. Kreinboing, Mich., writes:

Q. 1.—I have the following: One E. I. Co.'s (large) double slide tuner; one E. I. Co.'s (junior) double slide tuner; one E. I. Co.'s (large capacity) variable condenser; one E. I. Co.'s fixed condenser; one E. I. Co.'s potentiometer; one E. I. Co.'s electrolytic detector; one E. I. Co.'s auto-coherer; one Samson, Jr., 1,000-ohm receiver, and batteries. Kindly give diagram for above instruments.

A. 1.—See diagram below.



Q. 2.—Please state how far above will receive with a 75-foot aerial with four copper wires, running vertically.

A. 2.—You should be able to receive about 300 miles with this outfit, but the aerial should preferably run horizontally.

WIRELESS SCHOOL.

(982.) Wallace G. Palmer, Ca., asks:

Q. 1.—Would you kindly refer me to a school that teaches wireless telegraphy through correspondence?

A. 1.—We refer you to the Dodge Institute of Telegraphy, Valparaiso, Ind.

WIRELESS QUERIES.

(983.) B. E. Carson, Jr., Texas, asks:

Q. 1.—Now that I am a member of this great Wireless Association of America I feel that it is my duty to give you a wireless problem to solve for me. I have a fine receiving set which should receive from 1,500 to 2,000 miles, but I can hardly hear Galveston, Tex., a station fifty miles from here. I just came to a conclusion yesterday that it was the way I connect up the instruments that causes this defect. Con you send me a good wiring diagram to remedy this? I will be more than obliged to you. The instruments I am using are as follows: Two tuning coils, two detectors, two fixed condensers, potentiometer and receivers.

A. 1.—It is impossible to give you the information as you are not explicit enough in telling us exactly what your instruments are, especially the tuning coils, whether single or double slide. We refer you to our book, *Wireless Hook-ups*, which will give you complete information on wireless connections.

WIRELESS QUERIES.

(984.) Charles H. Zigler, Ind., asks:

Q. 1.—Will you kindly tell me how far I will be able to receive with a Clapp-Eastham loose couple tuner of 1,500 meters and E. I. Co.'s 17-plate variable condenser; also a fixed condenser of the same make, silicon detector, pair of 2,000-ohms head phones and an aerial 100 ft. high and 40 ft. long, with 4 aluminum wires?

A. 1.—We should judge about 600 miles and perhaps more.

Q. 2.—Please tell me how to cut down an E. I. Co.'s ½-kw. sending condenser so that it will work on a 2-inch coil. How many plates of aluminum and glass of the same condenser will be required to work the above coil?

A. 2.—As far as we know, you cannot cut down this condenser as it is sealed up and you would probably break it by taking it apart. Use 5 glass plates 10x12 with aluminum sheets 8x10 between, which will probably do for your sending outfit.

Q. 3.—How far should I be able to send at night with a 2-inch coil, Gernsback electrolytic interrupter and 110 A. C. current with aerial 100 ft. high and 40 ft. long, of 4 wires of aluminum of No. 14 size?

A. 3.—You should be able to transmit about 30 to 40 miles with this.

SPARK COIL.

(985.) J. M. Pach, N. J., writes:

Q. 1.—I have a primary spark coil intended for igniting a gas engine. It is nine inches long and one and a half inches in diameter, and wound with No. 18 D. C. C. wire. I wish to make this into a wireless coil.

A. 1.—We would not advise you to attempt to do this as you will probably meet with failure. It is practically impossible to change a gas igniting coil so as to be used for wireless.

CONNECTIONS.

(986.) H. Edgar Zust, L. I., N. Y., asks:

Q. 1.—I have "Electro" tuner, "Electro"

PATENTS

No attorney's fee until patent is allowed.
Write for *"Inventor's Guide."*
FRANKLIN H. HOUGH,
Loan and Trust Bldg., Washington, D. C.

When writing, please mention "Modern Electrics."

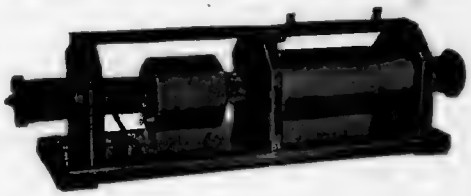
CUTS OF SCREW MACHINE WORK

Made to sample or Sketch

BINDING POSTS, METAL PARTS AND OTHER SPECIALTIES. MAGNET WIRE.
All kinds and sizes. Send for price list.
S. M. COHN & CO.
134 Liberty Street NEW YORK

When writing, please mention "Modern Electrics."

Wireless Transformers and Induction Coils



½ K. W. Transformer complete with Condenser and Spark Gap $30
This is something new. Send for Catalog and Prices
E. S. RITCHIE & SONS
115 Cypress St., Brookline, Mass.

When writing, please mention "Modern Electrics."

PATENTS
THAT PROTECT AND PAY
Books, Advice, Search and List of Inventions Wanted **FREE.** Send Sketch or Model for Search. Highest References. Best Results. Promptness Assured.
Watson E. Coleman, Patent Lawyer
622 F ST. N. W. WASHINGTON, D. C.

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Write for our books: "WHY PATENTS PAY," "100 MECHANICAL MOVEMENTS," "PERPETUAL MOTION"—50 Illustrations. MAILED FREE.
F. C. DIETRICH & CO., Patent Lawyers, Washington, D. C.

When writing, please mention "Modern Electrics."

ELECTRO "BULL-DOG" COILS

A revolution in spark coil construction. Our new "Bull-dog" coils mark the latest step in spark-coil advance.

Points of superiority over box coil type:
Better insulation.
One-third less weight.
More durable construction.
More compact.
Extremely air-cooled.
Pleasing design.

We substantiate every claim and furthermore add that our double French spring vibrator, coupled with double adjustment, gives a flame discharge (not a stringy spark), equalled by no other coil on the market. This is especially desirable for **Wireless Work** where a powerful, fat spark is required.

All our coils are guaranteed for one year and we will replace any coil which should prove defective during this period, if treated intelligently.

PRICE LIST:

½-inch coil. $3.10	1-inch coil, $4.50
1½-inch coil, 6.50	2-inch coil, 9.00
2½-inch coil, $13.50	

Send to-day 4 cents postage for our famous 196-page electrical cyclopedia containing over 400 illustrations, information on wireless, etc. No postals answered.
'Everything for the Experimenter."
THE ELECTRO IMPORTING CO.,
233-z Fulton St., New York, N. Y.

The Electrolytic Detector

is used in practically all long distance wireless stations in the world, and is recognized by highest authorities to be the most sensitive detector known.

In the "Standard" electrolytic detector we have eliminated the many troublesome features of the old types, and have added the results of long and thorough investigation as to the best form of solution, of wollaston wire, of cup, and of adjustment, necessary in order to obtain the highest possible sensitiveness to long distance wireless signals.

We should like to have an opportunity to prove to you that the "Standard" electrolytic is more sensitive than any mineral detector obtainable, and that it is as cleanly and convenient to operate.

Other "Standard" products include break keys, rotary spark gaps, double secondary tuning transformers giving twice the selectivity of the ordinary type, a new and exceedingly compact variable condenser of high capacity, and other ultra-modern devices, at present obtainable from no other firm in America. In writing for our literature, kindly state your requirements, as well as whether you are interested from a commercial, experimental, or a dealer's standpoint.

Standard Wireless Equipment Co.

R. R. 6, LOS ANGELES, CAL.

variable condenser, "Electro" fixed condenser, professional receivers and universal detectors. Would you be kind enough to draw a diagram showing the connections?

A. 1.—We refer you to query No. 884, March, 1911, issue.

WIRELESS TELEPHONE.

(987.) W. H. Mason, Colo., writes:

Q. 1.—I have made and used a C. C. wire coil for "wireless phone," induction type. What can I use in a receiver, watch-case, 75-ohm? I have tried a 2,000 but it does not increase the sound or voice. I use 80 coils, 15 feet diameter, No. 22 C. C., 4 or 7 batteries. What can I do to make it louder?

A. 1.—It is practically impossible to receive further than 75 feet with any induction set unless the circular coils are increased enormously, which makes the outfit impractical. It will not do either to increase the power of the battery, and we cannot be of any assistance to you in this.

HOOK-UP.

(988.) Joseph R. Barrett, Mass., asks:

Q. 1.—Would you kindly tell me my receiving distance? My tuner has rubber ends and rubber core on which the wire is wound. The condenser is a cylinder with a brass tube and rubber ends, a silicon detector, which has a wood base, and a pair of receivers each seven hundred and fifty ohms; my aerial is 40 ft. high and has five strands, each strand is 10 ft. long; below is the diagram of my instruments. Will you please tell me if it is the best way?

A. 1.—We do not see why you desire to use two ground connections and would suggest to cut off the gas pipe connection, which probably is the cause of your trouble. You should receive about 400 miles with your outfit.

QUENCHED SPARK.

(989.) Geo. C. Elmwood, Cal., writes:

Q. 1.—I have a dynamo, 2 kw., 100 cycle, 75 volt, and 27 amperes A. C. Wish to use an open core transformer made up of the following wire and dimensions: Core No. 20, Norway iron wire 36 inches long, primary No. 10, one layer 30 inches long; secondary, one section, seven inches wide, outside diameter 8 inches, wire winding 5½ inches wide, 104 layers, each with 264 turns No. 28 wire, D. C. C., 1½ kw. Will it work well with above dynamo?

A. 1.—We do not think you will have any trouble working this with your dynamo.

Q. 2.—Oil condenser made with copper plates 14x14 of which there are 10, separated by glazed oil paper and hard rubber sheet, ½-inch separation. Is this large enough, and if so, will it stand a larger coil or transformer?

A. 2.—The capacity is correct but we would not advise using hard rubber if it is to come in contact with the oil, as the latter will shortly destroy it.

Q. 3.—Have 5 phosphor bronze discs 2½ inches diameter. How far should I separate them to get the best spark, and how far should I be able to talk with the above set with aerial

86 ft. high, composed of No. 4 wire, aerial made from No. 14 aluminum wire and 4 strands?

A. 3.—We presume you wish to use the phosphor bronze disc for a quenched spark system. If so, they should not be more than 1/64th inch apart from each other. Mica rings should be used for insulation. You should send about 300 to 400 miles with your outfit.

90 MILES WITH ¼ Kw. "W. M." TRANSFORMER

WORTS-MCKISSON MFG CO., Toledo, O.
Gentlemen:—Your ¼ Kw. transformer received, and must say it works to perfection. I have talked to the steamships 90 miles from shore *in the Day Time*. Can and will recommend your instruments whenever I have the opportunity.
Yours very truly,
J. J. WATTERS, Port Richmond, N. Y.

Our new leaflet "C" lists 21 different sizes of transformers for any frequency or voltage, fresh from the press. Write for a copy.

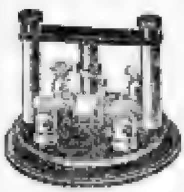
Worts-McKisson Mfg. Co., Dept. A. Toledo, Ohio.

SPECIAL COMBINATION OFFER OF WIRELESS STOCKS

One share MARCONI WIRELESS of America, par value	$25.00
One share MARCONI WIRELESS of Canada Par value	5.00
One share MARCONI WIRELESS of England, Common, Par value	5.00
One share MARCONI WIRELESS of England, Pref. (dividend paying), Par value	5.00
Total four (4) shares (Par value $40.00), cash with order, all for	$32.00

P. C. KULLMAN & CO.
Established 1889
The Wireless Brokers. 68 Wall St.. New York

WONDERFUL NEW DETECTOR



The perfect detector found at last. NO ADJUSTMENT of minerals, no sloppy acids. 25 per cent. more sensitive and 50 per cent louder than ANY OTHER. The only detector that is always on the job. Price $1.75. postage 16c extra. Send 8c in stamps for large illustrated catalogue of electrical specialties and WIRELESS APPARATUS.

FRANKLIN ELECTRIC NOVELTY & MFG. CO..
846 Ninth Avenue, New York, N. Y.
Levy Electric Co.. San Francisco, Cal., Western Agents.

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C. L. PARKER
Ex-Examiner U. S. Patent Office
PATENT LAWYER
8 McGill Bldg., Washington, D. C.

PATENTS, TRADEMARKS, COPYRIGHTS, PATENT LITIGATION
Handbook for Inventors. "Protecting, Exploiting and Selling Inventions" sent free upon request.

To introduce our carefully selected wireless goods we will fill orders received before June 30th for Spark Coils at 20 per cent., Rotary Variable No. 9 at 10 per cent., off catalog price.

Head Set—2,000 ohms, moulded double pole receivers with enamel insulated copper winding, leather-covered adjustable head band, and 5 ft. cord, $4.50. Specially constructed for wireless,—no rewound.

Just out: A new Rotary Condenser; something entirely different, $3.50. Write for particulars.

J. ELLIOTT SHAW CO.
632 Arch St., Phila., Pa.

"T. W. C." TRANSFORMERS

¼ kw., $16; ½ kw., $20; 1 kw., $35; 2 kw., $60, and up to 5 kw. These transformers are closed core and made of the best and softest iron. A maximum number of turns in both primary and secondary is secured, making them very efficient. They can be connected directly across the line without the use of resistances or interrupters. Write for leaflet listing transmitting sets up to 5 kw.

SPECIAL: Until September 1st, we offer 10 per cent. off on our goods including the above prices.

TOLEDO WIRELESS CO., 2451 Collingwood Ave., Toledo, Ohio.

When writing, please mention "Modern Electrics."

Patents 25 Years' Experience
New Easy Plan of Payment

BOOK MAILED FREE, telling all about Patents and how to obtain them. Illustrates 100 MECHANICAL MOVEMENTS, VALUABLE FOR INVENTORS.

CHAS. E. BROCK, Patent Attorney
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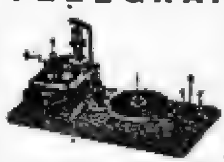
TELEGRAPHY TAUGHT



in the shortest possible time The Omnigraph Automatic Transmitter combined with standard key and sounder. Sends you telegraph messages at any speed just as an expert operator would. Five styles $2 up. Circular free.

Omnigraph Mfg. Co.
39½ Cortlandt St., New York

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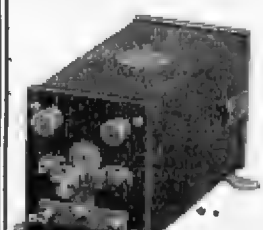
MUS-KEE-GON

MORE SPARK COIL BARGAINS



We have a lot of spark coils originally manufactured for a big engine company. They went out of the engine business and asked us to take the coils back. We took them—at a very low price and we will sell them at less than factory cost. They are perfectly good for either IGNITION or WIRELESS. Spark length ¼ to ⅜ inches.

Worth $3.00. Close out at $1.65 each
CASH MUST ACCOMPANY ORDER

MUSKEGON COIL CO.—Dep't. K., Muskegon, Mich.

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Advertisements in this column, 2 cents a word, no display of any kind. Payable in advance. Stamps not accepted. Count 7 words per line. Minimum, 2 lines. Heavy face type 4 cents a word. Minimum, 3 lines.

Advertisements under "Wireless" 5 cents a word. Minimum, 4 lines. Wireless books and blue prints not listed under "Wireless," 2 cents a word.

ADVERTISEMENTS FOR THE JULY ISSUE MUST BE IN OUR HANDS BY JUNE 25.

ELECTRICAL APPARATUS

1000 guaranteed pocket ammeters for testing batteries. Handsomely nickelplated. Each instrument in a chamois leather case, 25c postpaid. Stamps taken. Auto Repair Co., 521-23 West 144th St., New York.

ARE YOU supplied with all the electrical apparatus you need? Our prices are the lowest. Special instruments made to order. Edetric Supply Co., 4852B No. Winchester Ave., Chicago.

MORE VOLTAGE. MORE AMPERAGE, MORE LIFE. Send fifteen cents and get enough Battery Renewal Salts to recharge from four to six dry cells. Two packages, twenty-five cents. Full directions with each package. Send early and receive prompt delivery.. L. Henry, 442 Allen St., Allentown, Pa.

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ELECTRICAL BOOKS, BLUEPRINTS, ETC

SCIENTIFIC BOOKS on Electricity, Mechanics, Trades, etc., for Skilled Tradesmen and Experimenters. Catalogue free. Clarence B. Hardage, Book-Monger, Syracuse, N. Y. (12)

PUBLICATIONS: "Keen Knowledge." Annual subscription 25c. Quarterly, 10c. Palmland, Brokaw Ave., Floral Park, N. Y. (2)

DON'T FORGET to get a set of directions for making a complete wireless station. Only a few left. 25c. Edetric Supply Co., 4852B No. Winchester Ave., Chicago.

GO ON THE STAGE! Will tell you how! Write for descriptive matter. It is free! Percy Ewing, Decatur, Ill. (3)

CACHOO: A harmless powder that makes people sneeze. Sample 10c. dozen 80c, hundred $5. Ewing's, 192 Thatcher Place, Decatur, Ill. (3)

EVERY VALUE TESTED, 375 FORMULAS, including household specialties, medical and toilet preparations, special money making secrets, etc., reduced to 15c. Free bargain circulars. Barstow Co., 514 23d St., Oakland, Calif.

Light your home with four dry batteries. New system. Send 20c for print and details. W. L. Booth, Pullman, Washington.

When writing, please mention "Modern Electrics."

WIRELESS

LOOSE COUPLER TUBING. Tubing, 5 and 4½, 25 cents per foot; postage, 8 cents per foot. 4, 3¾, 3½, 3, 15 cents per foot; postage, 6 cents per foot. 2, 2½, 10 cents per foot. Amateurs supplies of all kinds circulars mailed. Middlesex Wireless Supply Co., 12 Beacon St., Somerville, Mass.

PROTECT YOUR STATION FROM LIGHTNING! Write to The Edelman Laboratory, 2432 Lyndale South, Minneapolis, Minn.

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WIRELESS FIENDS.

Phosphor Bronze Aerial Wire as used by Government, the best yet. Just imported 25,000 feet. 1½ cts. per foot. Bornite and Zincite, the most sensitive combination, 50 cts. per set. Zincite and Copper Pyrites, 50 cts. per set. Silver plated brass cup for mounting crystals, 10 cts. each. Sliders (for square rod ¼-in.x¼in.) with ball and spring, 20 cts. complete. Black Asphaltum, Black and White Shellac, liquid ready for use, large bottle, 25 cts. Spool containing 1000 Ohms No. 50 Copper Wire, 60 cts. Silicon or Molybdenite, large piece, 15 cts. Send postage stamp for 196 page Catalog.

Electro Importing Co., 233-z Fulton St., N. Y.

Wireless fiends save freight and expressage. Why order from the East if you can secure ALL wireless goods on the Coast? We carry largest assortment of wireless apparatus in Frisco. Can make prompt shipments. Call or send postage for catalog. Paul Seiler Electric Works, Market street, San Francisco, Cal.

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FOR SALE

FOR SALE: Brass moulds for casting storage battery plates. Home Mfg. Co., 5419 Windsor Ave., Jefferson Park, Chicago, Ill. (5)

FOR SALE: 9 k.w. 4 pole compound wound Bullock generator, 500 volts, 18 amp., used little, good as new, $75. Earl Cline, Marietta, Ohio.

One-quarter kilowatt transformers, twenty-five dollars. Send stamp for particulars. T. W. Huntington, Jr., 2629 Pacific Ave., San Francisco, Calif.

1 k.w. closed core transformer, designed by Prof. Twining, highly efficient, new and in perfect condition. Price $25.00. E. W. Cole, 2370 Vermont Ave., Toledo, Ohio.

FOR SALE: Three-quarter k.w. transformer, price $17, range of 100 miles; ¼ k.w. transformer, $12, range 30 miles. Owner giving up wireless. R. M. Perry, 237 Tremont Ave., San Francisco, Calif.

FOR SALE: Complete wireless plant, 2½ k.w. capacity transformer. Particulars on application by letter to E. F. Zimmerman, 249 Auburn Ave., Buffalo, N. Y.

FOR SALE: Wireless outfit, electrical apparatus, novelties, etc. M. K. Jacobs, Kendallville, Ind.

FOR SALE: One-half k.w. transformer coil, electrolytic interrupter, reactance coil, $7; tubular variable condenser, $1; electrolytic detector and potentiometer, $1.25. Harold Umbarger, Mansfield, Ohio.

FOR SALE: One-half k.w. transformer coil, electrolytic interrupter, reactance coil, $7; tubular variable condenser, $1; electrolytic detector and potentiometer, $1.25. Harold Umbarger, Mansfield, Ohio.

FOR SALE: Storage battery, spark coil, telephone receivers, head band, telephone cords, etc. Wm. Storkel, 3953a McPherson Ave., St. Louis, Mo.

When writing, please mention "Modern Electrics."

WANTED

WANTED MEN to sell our Modern Gasoline Lighting Systems, adapted for lighting stores, churches, residences, etc.; better light at 1-10th the expense of any other medium; reasonable in price, easily installed; exclusive territory; write today for FREE Illustrated Catalogue. Doud Lighting Co., 183 N. Sangamon St., Chicago, Ill. (3)

EXCHANGE: Will trade fine 2 k.w. Transformer for big spark coil for X-Ray. Write anyway. E. H. Easton, Bellingham, Wash.

When writing, please mention "Modern Electrics."

Wireless Association of America

THE Wireless Association of America has been founded with the sole object of furthering the interests of wireless telegraphy and telephony in America.

We are now on the threshold of the wireless era, and just beginning to rub our intellectual eyes, as it were. Sometimes we look over the wall of our barred knowledge in amazement, wondering what lays beyond the wall, as yet covered with a dense haze.

However, young America, up to the occasion, is wide awake as usual.

Foreign wireless experts, invariably exclaim in wonder when viewing the photographs appearing in each month in the "Wireless Contest" of MODERN ELECTRICS. They cannot grasp the idea that boys 14 years old actually operate wireless stations successfully everyday in the year under all conditions but they are all of the undivided opinion that Young America leads the rest of the world wirelessly.

So far America has led in the race. The next thing is to stay in the front, and let others follow. In fact he would be a bold prophet who would even dare hint at the wonders to come during the next decade. The boy experimenting in an attic to-day may be an authority to-morrow.

As stated before the Wireless Association's sole aim is to further the interests of experimental wireless telegraphy and telephony in this country.

Headed by America's foremost wireless men, it is not a money-making institution. There are no membership fees, and no contributions required to become a member.

There are two conditions only. Each member of the Association must be an American citizen and MUST OWN A WIRELESS STATION, either for sending or for receiving or both.

The Association furnishes a membership button as per our illustration. This button is sold at actual cost. Price 20 cents.

This button is made of bronze, triple silver-plated. The flashes from the wireless pole are laid in hard red enamel, which makes the button quite distinctive. The button furthermore has the usual screw back making it easy to fasten to buttonhole. The lettering itself is laid in black hard enamel. Size exactly as cut.

On account of the heavy plating it will last for years and is guaranteed not to wear "brassy." Beautiful solid gold button, $2.00.

Its diameter is 3-4 inch. This is a trifle larger than usual, the purpose being to show the button off so that it can be readily seen from a distance. The reason is obvious. Suppose you are a wireless experimenter and you live in a fairly large town. If you see a stranger with the Association button, you, of course, would not be backward talking to the wearer and in this manner become acquainted with those having a common object in mind, which is the successful development of "wireless."

The Association furthermore wishes to be of assistance to experimenters and inventors of wireless appliances and apparatus, if the owners are not capable to market or work out their inventions. Such information and advice will be given free. Somebody suggested that Wireless Clubs should be formed in various towns, and while this idea is of course feasible in the larger towns, it is fallacious in smaller towns where at best only two or three wireless experimenters can be found.

Most experimenters would rather spend their money in maintaining and enlarging their wireless stations, instead of contributing fees to maintain clubs or meeting rooms, etc., etc.

The Board of Directors of this Association earnestly request every wireless experimenter and owner of a station to apply for membership in the Association by submitting his name, address, location, instruments used, etc., etc., to the business manager. There is no charge or fee whatever connected with this.

Each member will be recorded and all members will be classified by town and State.

Members are at liberty to inquire from the Association if other wireless experimenters within their locality have registered. Such information will be furnished free if stamped return envelope is forwarded with inquiry.

SEND TO-DAY FOR FREE APPLICATION CARD

SPECIAL THIS MONTH

On receipt of 30 cents cash, stamps, or money order, we will send you above Wireless Button and the Third Annual Blue Book. Order to-day.

The Association Numbered June 1, 1911 **12,649** The Greatest Wireless Association in the World.

ADDRESS ALL COMMUNICATIONS TO

WIRELESS ASSOCIATION of AMERICA

233 FULTON STREET

NEW YORK

FOUR EXTRAORDINARY OFFERS:

To make June our banner subscription month, we are willing to make the following FOUR WONDERFUL OFFERS. Frankly, we would like to see your name appear among the 51,000 readers, who are now regular subscribers, and in order to do so, we are willing to go to an EXTRAORDINARY EXPENSE, never before attempted by any magazine.

OFFER NO. 1.

Send us $1.00 cash, stamps, or money order, and in return, we will send you:

1—Modern Electrics for one year (June issue free)	$1.00
2—Book, How to Make Wireless Instruments, cost	.25
3—Book, The Wireless Telephone, by H. Gernsback, cost	.25
4—Book, Construction of Induction Coils and Transformers, by H. W. Secor, cost..	.25
Total.....	$1.75
(If books are to be mailed add 6c. postage)	
TOTAL NET SAVING.....	.75

OFFER NO. 2.

Send us $1.00 cash, stamps, or money order, and in return, we will send you:

1—Modern Electrics for one year (June issue free)	$1.00
2—Wirless Code Chart, cardboard; size 9x12 in., Morse, Navy and Continental codes	.10
3—Wireless chart with 20 Wireless Standard "Hook-ups"	.10
4—Join the Wireless Association of America, and Wireless Pin	.25
5—Official Wireless Blue Book. 32 pages, and 13x10 in. chart of U. S. stations.....	.25
6—Any one of the 3 books shown in offer No. 1.....	.25
Total.....	$1.85
(Mail charges for Items 2, 3, 4, 5, 6, 8c. extra.)	
TOTAL NET SAVING.....	.00

OFFER NO. 3.

Send us $1.00 cash, stamps, or money order, and in return, we will send you:

1—Modern Electrics for one year (June issue free)	$1.00
2—Linen Binder (automatic) holds 12 issues M. E., gold stamped.....	.50
3—Any one of the 3 books shown in offer No. 1.....	.25
Total.....	$1.75
(Mail charges for Items 2 and 3, 15c. extra.)	
TOTAL NET SAVING.....	.75

OFFER NO. 4.

Send us $1.00 cash, stamps, or money order, and in return, we will send you:

1—Modern Electrics for one year (June issue free)	$1.00
2—12 back numbers of Modern Electrics, all consecutive numbers, all in good condition, each 10c.	1.20
Total.....	$2.20
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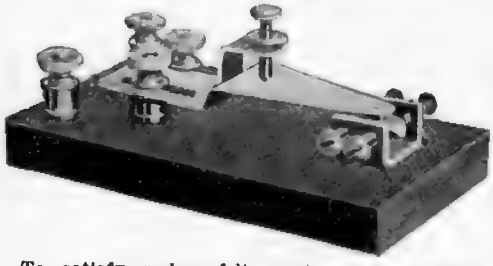

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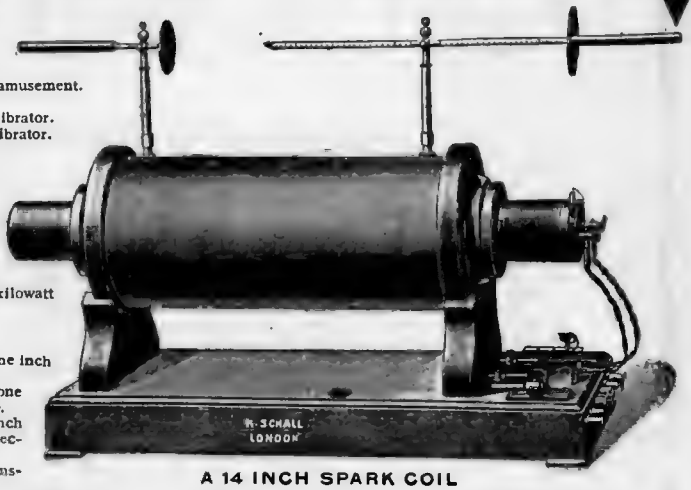

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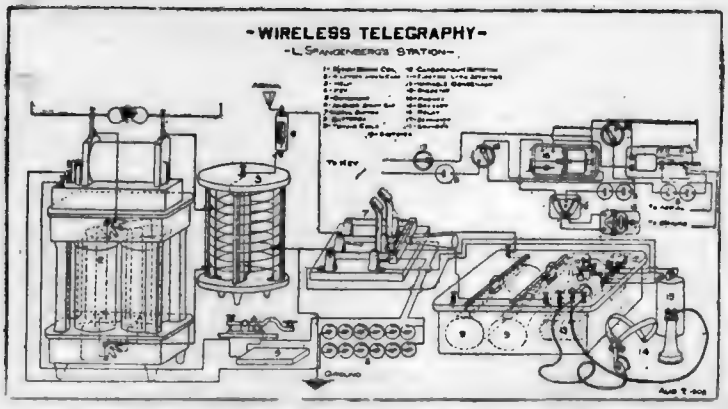

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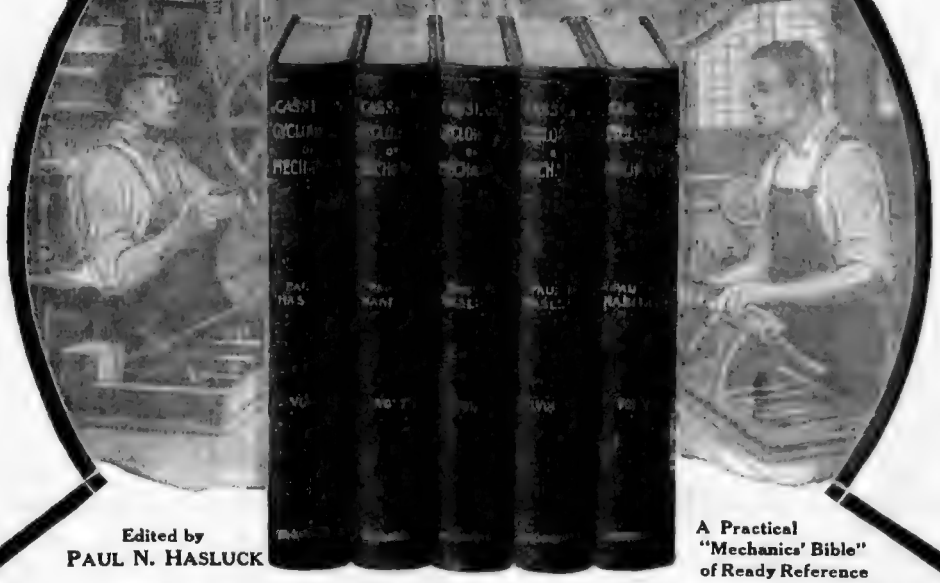

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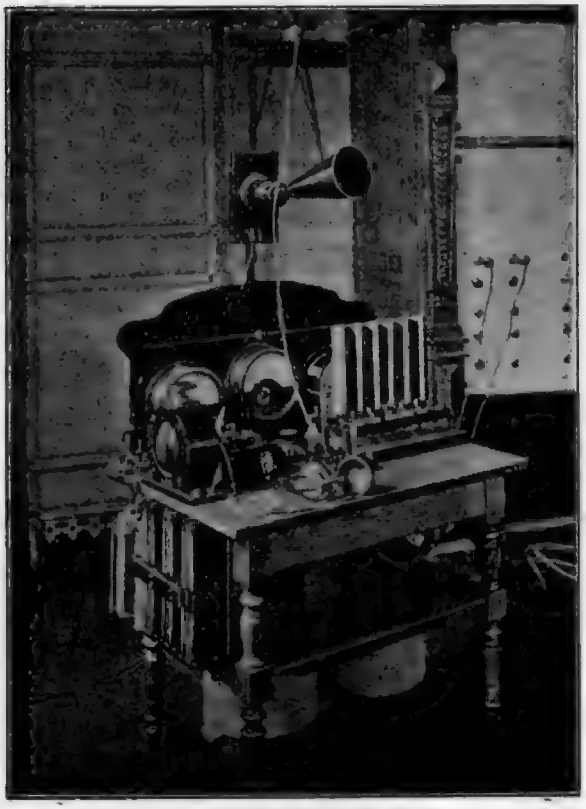

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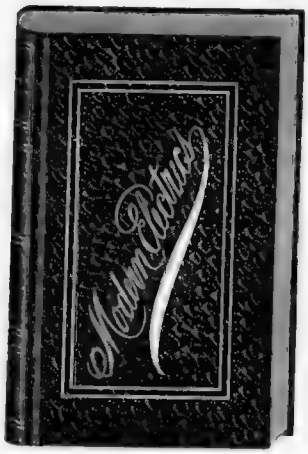

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No. 32 B. & S., S. S. **Enamel**	1 lb. 9 oz	" 5.38	" 3.25
No. 32 B. & S., S. S. **Enamel**	1 lb. 4 oz	" 4.30	" 2.60
No. 32 B. & S., S. S. **Enamel**	4 oz	" 0.86	" .55
No. 32 B. & S., S. S. **Enamel**	10 oz	" 2.15	" 1.30
No. 32 B. & S., S. S. **Enamel**	13 oz	" 2.80	" 1.68
No. 32 B. & S., S. S. **Enamel**	6 lbs	" 20.40	" 12.25
No. 32 B. & S., S. S.	3 lb. 7 oz	" 6.80	" 4.10
No. 32 B. & S., S. S. **Enamel**	2 lb. 4 oz	" 7.65	" 4.60
No. 32 B. & S., S. S.	2 lb. 5 oz	" 4.60	" 2.76
No. 32 B. & S., S. S.	2 lb. 6 oz	" 4.72	" 2.85
No. 33 B. & S., S. S.	3 lb. 15 oz	" 7.82	" 4.70
No. 34 B. & S., S. S.	11 oz	" 1.76	" 1.06
No. 34 B. & S., S. S. **Enamel**	13 oz	" 3.77	" 2.27
No. 34 B. & S., S. S. **Enamel**	1 lb 8 oz	" 6.96	" 4.20
No. 34 B. & S., S. S.	14 oz	" 4.06	" 2.45
No. 34 B. & S., S. S.	1 lb. 12 oz	" 4.45	" 2.70
No. 34 B. & S., S. S.	1 lb. 4 oz	" 3.16	" 1.90
No. 35 B. & S., S. S.	2 lb. 1 oz	" 5.95	" 3.60
No. 36 B. & S., S. S.	5 oz	" 1.00	" 0.60
No. 36 B. & S., S. S.	1 lb. 4 oz	" 4.00	" 2.40
No. 36 B. & S., S. S.	1 lb. 10 oz	" 5.20	" 3.12
No. 36 B. & S., S. S.	6 oz	" 1.20	" 0.75
No. 36 B. & S., S.S.	12 oz	" 2.40	" 1.45
No. 40 B. & S., S. S.	1 lb. 3 oz	" 9.50	" 5.70

NOTE.—The enamel, single silk covered wire was made especially by the **General Electric Company** for spark coil work.

ALUMINUM MAGNET WIRE.

Something new for spark coils. On account of the higher resistance ¼ **less wire needed** than for copper. **One ounce of this replaces six of copper wire.**

No. 35 B. & S., Aluminum S. S.	4 oz	Catalog Price $2.90	Now $1.75
No. 36 B. & S., Aluminum S. S.	4 oz	" 3.40	" 2.05
No. 36 B. & S., Aluminum S. S.	4 oz	" 3.40	" 2.05

156 **SOLID MAHOGANY CASES** (Took them in payment of old debt). Heavy nickel handle, especially suited for portable wireless sets. If you can have this box made for less than $2.00, we will refund your money. Absolutely new; finest polish. Size 9x5¾x7½. Price.. $1.00

ONE LARGE WAVEMETER, E. I. Co. make. Cost to build, $22.00. Size 10x10x11. Price... $12.50

ONE EXPERIMENTAL 2-INCH SPARK COIL, with two vibrators (one on each end of core). Cost to build, $11.00. Now.... 9.00

ONE IMPORTED FRENCH MILLIAMPEREMETER. Cost originally, $26.85. Now.... 15.00

THREE WESTERN ELECTRIC, 300 Ohm commercial relays, hard rubber covered spools, adjustable. Size 8x4½x4½ inches. Price originally (each), $7.50. Now (each).... 4.00

ONE SOLID "ELECTROSE" LEAD-IN, 9x2½ inches; 1-inch hole. Cost originally, $2.75. Now.... 1.25

ONE THERMO-ELECTRIC CELL. Works with gas; can be used to light a small lamp. Cost $10.00. Now.... 3.00

36 **FRENCH IMPORTED AUTOMATIC ARC LAMPS.** Fine regulation. For regular lighting work and for **wireless telephone** and **singing arc light.** Cost originally, each, $8.00. Will refund money if not satisfactory. Resistance goes with each lamp. Now, each.... 3.50

ONE 1-5 H. P. 6-VOLT MOTOR. Runs on 2 volts. An old type, but a generous built motor. Has surprising power. Cost originally, $12.50. Weight, 8 lbs. Now.... 4.00

ONE HARD RUBBER TUBE, 6-inch diameter, 8½ inches long, ⅛ inch thick. Cost originally, $4.00. Now.... 2.00

350 **NEW MAHOGANY FINISHED** (our No. 9230) Detector Bases. Cost, each, 10c. Now.... 6c

175 **NEW MAHOGANY FINISHED** (our No. 1098) Auto Coherer Bases. Cost, each, 10c. Now.. 6c

750 **NEW MAHOGANY FINISHED** (our No. 3¼x¾ in.) "Tellmcometer" Bases. Cost, each, 9c. Now.... 5c

109 **NEW OAK** (our No. 9002), old model Electrolytic Detector Bases, 1 inch thick, 5 inch diameter. Cost, each, 15c. Now.... 8c

35 **NEW OAK FINISHED** (our No. 12000 and 12001) Loose Coupler Frames (ends are slightly warped). Cost 55c. To clear out, each, now.... 20c

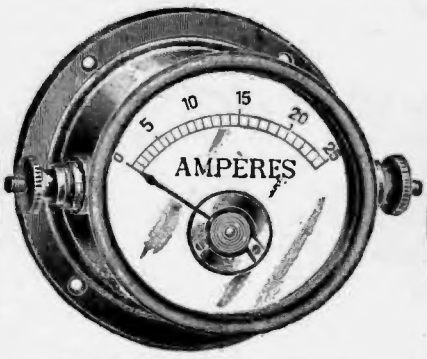
15 **NEW OAK FINISHED** (our No. 8050 and 8060), Transformer Coil Cases (slightly warped covers). Cost 60c. Each, now.... 30c

2160 **NEW OAK** Coherer and Decoherer Bases (our No. 1097); edges finely finished. Size 7x3½x½ in. Cost 16c. Now.... 9c

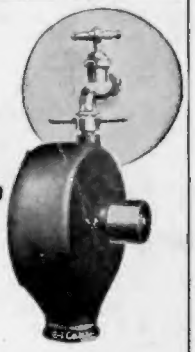
GERNSBACK RELAY ELECTROMAGNETS. Used on the Patent Gernsback Relay. Size 1¼x⅞ in. Finely finished. **Silver contact on core.** Three kinds (all same size). 20 Ohms, 50 Ohms, 75 Ohms. Bottom of core takes 8-32 screw. Cost 29c, 37c, 49c each, respectively. **Will sell this month as follows:** 20 Ohms, each, 20c; 50 Ohms, each, 30c; 75 Ohms, each, 40c. By mail extra, each 4c.

BARGAINS

No. 555. 6 V 60 A. Storage Battery,
Regular price, $8.00.
This Month, $7.50



No. 1037-39. Volt or Ammeter,
Regular price, $3.00
This Month, $2.75

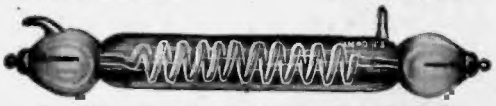


No. 1492. Water Motor, Regular price, $4.00.
This Month, $3.40

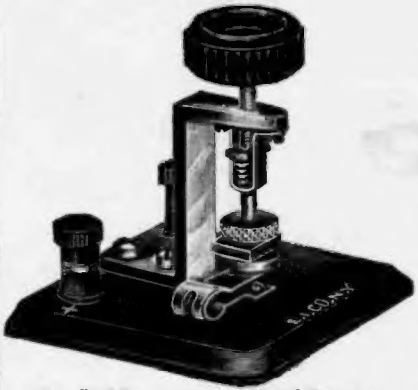
No. 9220a. Adjustable Spark Gap,
Regular price, $1.00
This Month, 85c

No. 8070. Amateur Phones,
2000 Ohms, Double Pole,
Regular price, $4.50,
This Month, $4.20

Adjustable Lamp Bracket,
Regular price, $1.25
This Month, 65c



4-Inch Liquid Geissler Tube, Regular price, $1.25.
This Month, 28c Six Inch Liquid Tube, **40c**



No. 9235. Peroxide of Lead Detector,
Regular price, $1.25
This Month, $1.00

No. 9950. Jr. Tuner, Bare Wire Wound, hard rubber ends, best Tuner made. Regular price, $2.00. **This month, $1.80**

Above prices good only up to July 10th
If articles are to be mailed, add mail charges

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